The Garden Journal

of the New York Botanical Garden

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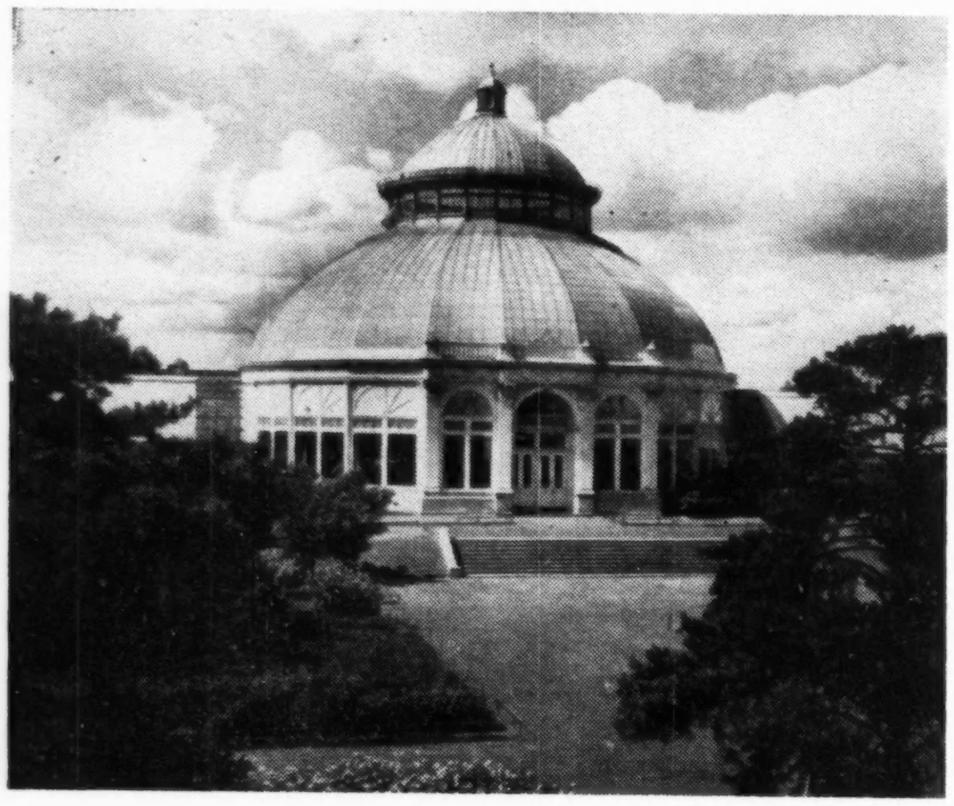

MID-WINTER DISPLAYS
In The Conservatory

March 16 — April 1, 1951, in House No. 4. Peter Rabbit's Country Estate. Also grand display of Easter lilies, daffodils and other flowering plants.

April 16 — 29, 1951, in House No. 4. A Floral Medley—a colorful arrangement of flowering annuals, bulbs, herbaceous plants and shrubs.

DOROTHY EBEL HANSELL
Editor

THE GARDEN JOURNAL
of The New York Botanical Garden

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AMONG OUR CONTRIBUTORS

Everyone who comes in contact with MARJORIE (Mrs. DONALD N.) KIRKPATRICK fall under the spell of her enthusiasm for birds — she writes and talks about them and is the very active Birds Chairman of the Garden Club of New Jersey . . . CLARENCE and ELEANOR G. BIRDSEYE know the joys of wild flower gardening and generously share them with others, are authors of "Growing Woodland Plants" to be published this spring by Oxford University Press. Mr. Birdseye is a pioneer in the development of processes and equipment for quick-freezing and dehydrating food . . . DR. CLAIR A. BROWN, Professor of Botany at Louisiana State University, is a transplanted Yankee, with no desire to shovel coal or snow; in addition to teaching he is engaged in research on flora of his adopted state, has written "Trees and Shrubs of Louisiana" and, with Dr. Don Cornell, "Ferns and Fern Allies of Louisiana"... PASCHAL CAMPBELL, after completing his course in landscape architecture at Texas A. & M. College, spent a year in research on landscape architecture in South American cities, studied and traveled in Europe, and is now a landscape consultant . . . A. W. ANDERSON left his native Scotland in 1926 for New Zealand; has been Superintendent of parks and reserves and Curator of botanical gardens at Timaru for a number of years; is author of "The Coming of the Flowers"... J. H. BEALE has been with Boyce Thompson Institute, Yonkers, N. Y., for twenty-five years, is Superintendent of its arboretum . . . DR. P. P. PIRONE, Plant Pathologist of The New York Botanical Garden, recently gave a talk on 'Controlling Crabgrass and other Weeds with Chemicals" in the Garden's annual downtown lecture series at the home of Mrs. Thomas J. Watson — we're delighted to present part of Dr. Pirone's talk in this issue of The Garden Journal . . . ELIZABETH REMSEN VAN 'BRUNT is Honorary Curator of Culinary Herbs at the Brooklyn Botanic Garden, loves the country and doesn't miss all the "things" one can do in town . . . DR. A. C. SMITH is Curator of Division of Phanerogams, U. S. National Museum, Smithsonian Institution . . . FRANK C. MacKEEVER we introduced last month as Custodian of the Herbaruim of The New York Botanical Garden . . . DR. H. W. RICKETT, Bibliographer of The New York Botanical Garden, former Editor of the Bulletin of the Torrey Botanical Club, is author of "The Green Earth", and, with Dr. William J. Robbins, of a college text book on botany.

CREDITS FOR ILLUSTRATIONS

Front cover, kodachrome of an Easter scene in The New York Botanical Garden, Gottscho-Schleisner; illustrations on page 35, Dr. Edgar T. Wherry; pages 36, 37, 38, 39, Dr. Clair A. Brown; page 41, La Gazette Illustree des Amateurs de Jardins; page 43, A. W. Anderson; pages 45, 46, E. N. Mitchell; pages 48, 49, 50, Gottscho-Schleisner; page 51, E. N. Mitchell; back cover, photo of one of the daffodil plantings at The New York Botanical Garden, E. N. Mitchell.

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Outside in the chill sunlight of early March the gaunt trees uphold wooden fingers against the pale sky. A branch fell in yesterday's wind; it will soon be cut up and burned on the hearth. It is difficult to believe that that stick, hard, fibrous, combustible, was recently alive; that in it was living material like that in your own flesh and blood, — the whirling atoms of life.

Yet will those stiff trunks and branches, in a few weeks now, break out a delicate greenery, visibly surging into new growth; adorning themselves also with flowers according to their kind. In a short time the entire brown land clothes itself with the voluminous cloak of green which it wears for the summer. Life, now sluggish, dormant, suddenly quickens and moves towards abundance and fecundity.

H. W. Rickett in "THE GREEN EARTH".

Spring Chasing

By Marjorie Sandt Kirkpatrick

SPRING can be a very frustrating season. Don and I are always anxious to get our garden in shape, but at the same time we long to wander off in search of migratory birds. Consequently, one spring, when the notice went up on the plant bulletin board proclaiming a long Memorial Day week-end, we decided that for once we would endeavor to keep up with spring and prolong our enjoyment of her touch. Friday night we turned our car northward in pursuit.

Our first stop was for a picnic supper at the crest of a hill beyond Newburgh on Route 32. While we fed our bodies with food, we fed our souls with the lovely vista of the Catskills rearing their heads above the lower Shawangunk range just before us. The thrushes sang their evening lay and red-eyed vireos chanted, but onward we must go for spring had already been here. Albany was soon reached and we stopped for the night. We were catching up, for "Tulip Week" had just concluded and the hotel still wore their stately blooms in its halls. The cries of the nighthawks seemed very close to our tenth floor room, but morning found the songs of the robins strangely remote.

The next day was a perfect one and miles flew by on U. S. Route 9. Even our station wagon seemed to have caught the spirit of the chase and ran like a hound after a fox. Saratoga and Glens Falls were quickly left behind. Soon Lake George stretched out ahead and everywhere lilacs, which at home had long since turned brown, were just blooming. A white-throated sparrow sang; perhaps it was one that had left our feeding station several weeks before. Loon Lake, Schroon Lake and then came Underwood where we left Route 9 and started through beautiful Keene Valley. Here were high mountains, deep gorges, tall evergreens and black lakes ringed with newly-leafed deciduous trees. Climbing ever higher and higher, we noticed the small leaves on the trees and felt certain that at last we had found early spring, but at noon, as we dipped into Lake Placid, she partially eluded us for here late tulips bloomed under a blue, blue sky.

In such perfect weather, a mountain must be climbed even though the day was half spent. Our choice was a little one just behind Adirondack Loj, noted for its excellent view of the tallest peaks. Climbing over the summit rock, we looked down on beautiful green valleys threaded with streams and spiced with brilliant lakes and geometric fields. Blackpoll warblers sang and veerys whistled. Whiteface Mountain, a monadnock, stood out boldly to the north, snow-patched Marcy capped the long tall range to the east, while MacIntyre dominated the foreground, suggesting pleasant memories of a previous climb. Beside it the sheer granite face of Mount Colden gave evidence of the big slide which occurred many years ago, turning the pass between this mountain and MacIntyre into chaos and damming Colden Brook to form Avalanche Lake. Perhaps spring still lingered in the depths of Avalanche Pass so there we would seek her out on the morrow.

The next day, as we started out, the mountains wore cloud caps. Regal trillium and gentle violets, wiry anemone and drooping merrybells colored the trail; spring had touched here but not passed for only one or two moccasin flowers were in bloom. Following a crystal clear branch of Marcy Brook, we climbed up into a very narrow pass between high overhanging rock walls. Don and Werner, our climbing companion, dashed ahead for they had discovered a remnant of winter and soon snowballs were flying through the air. No trees bloomed nor any bird sang, leaves were matted by snow recently melted, no flowers tossed their

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Swapping with Nature

By Clarence and Eleanor G. Birdseye

COLLECTING woods plants should be a "swap" instead of a steal, and nature should always profit by the exchange! If that were the practice among wildgarden enthusiasts, their hobby would replenish and not denude our dwindling roadside woodlands. Swapping with nature is both easy and interesting. It's more fun to "put back" than to "take out"; and every successful wildflower garden produces surplus plants, many of them rare or entirely missing from nearby areas.

Of course, swapping with nature is only one of many ways to dispose of your surplus woods plants. You will use many to extend your own garden, if you are fortunate enough to have appropriate nooks for so doing. Then you will want to exchange with local enthusiasts, and to use some of your more easily-grown plants to induce friends to join in your hobby. Or perhaps, if you have an unusually large and successful garden, you can sell to, or exchange with, a professional wildflower nursery.

But sooner or later you'll be ready to swap with nature, because some of your most interesting woods flowers and ferns will thrive beyond all expectations and fairly force you to return them to the wild.

For instance, a dozen years ago we spotted some nearly-dead great solomon-seal (*Polygonatum commutatum*) struggling in an ash dump by the roadside, where they had been discarded years before. We dug up some of the plants, carried them several hundred miles and set them out in moderately acid, humus-rich soil under a clump of gray birches at the side of our lawn. Ever since then, they've multiplied like guinea pigs and we've given away massive clumps to our friends, exchanged with nursery men, naturalized hundreds in nearby woodlands—and still have all we can use in our own woods gardens.

The narrow beech fern (*Dryopteris Phegopteris*), whose graceful fronds form one of the best groundcovers for woods gardens, is mighty scarce in our section of eastern Massachusetts. But our original few root-stocks, taken from an about-to-be-stripped area, have multiplied several thousandfold — enough, after supplying our friends and neighbors, to start nuclei in half-a-hundred roadside woods.

Other ferns, too, have done exceptionally well for us. The oakfern (*Dryopteris disjuncta*), resembling a tiny bracken in shape and habit but preferring richer and damper soil, was not to be found (by us, at least) within miles of Cape Ann, till we set out its matted root-stocks in shaded woods around springs and brooks.

Ostrich fern (*Pteretis nodulosa*), however common in other areas, is rare or absent for miles around our home. But we've managed to set out quite a few in sandy, humus-rich, wet, semi-shaded areas in our neighborhood.

Even the magnificent Goldie woodfern (*Dryopteris Goldiana*), normally found in deep, moist woods at moderate elevations and in nearly neutral soil, has flourished in our windswept sea-level garden and furnished surplus for transfer to areas where it has not been known "since the memory of man runneth not to the contrary." The tiny, rock-loving rusty woodsia (*Woodsia ilvensis*) which we have happened on only once in the wild state, has thrived in our well-watered, sunny granite ledges to such an extent that our original plant, obtained only three years ago, has been separated into twenty-six husky specimens. So far, however, we haven't found a suitable wild area for any of them.

Still other woods plants which have yielded us large surpluses are jack-in-the-pulpit, starry solomon-plume, hairy solomon-seal, wild ginger, bloodroot, fringed bleeding heart, wineleaf cinquefoil and cowberry.

Anyway, if you are an earnest woods gardener, you'll be certain to have surplus plants to return to the woods. Do so according to some well-worked-out plan, remembering that your primary purpose should be to set your plants where they will give other enthusiasts the most pleasure and at the same time be least likely to fall prey to vandals, fire, road-building or housing operations, grazing or other catastrophies.

Of course, your plants will have a better chance of survival if they are started on "preserved" land, public or private. In either case, you'll want the permission and cooperation of the owners. Remember that if you are discovered while doing your "good deed" without permission, you may be suspected of collecting instead of contributing the plants in your possession. Permission is especially necessary, if you wish actually to swap plants with the area. If you don't feel up to handling the transplanting job "on your own", it's a mighty good idea to secure the cooperation of a garden club group.

Having selected the general area of your operation, search out suitable conditions for each of the species you wish to transplant. Otherwise your contributions will be wasted. Most woods plants are exacting with regard to light, soil composition and moisture —though a few species are much more adaptable. As a rule, woods plants require humus-rich soil of appropriate acidity, shade, moisture and protection from drying winds. Dense deciduous or mixed woods on rocky northern slopes are especially favorable.

Most woods plants will thrive only within a narrow range of soil "reaction" (i.e. soil acidity or alkalinity), and your plants will not take hold unless the reaction of the soil where you place them is suitable. For instance, round-leafed and sharp-lobed hepaticas, although rather difficult to tell apart, will not thrive under the same conditions. The former require very acid soil such as that found on a rocky slope in an oak-and-beech for-

***Upper Left*: The tiny, rock-loving woodsia has thrived in the author's garden in well-watered, sunny granite ledges. *Upper Right*: The ostrich fern enjoys humus-rich, wet, semi-shaded situations. *Lower Left*: Goldie wood fern, normally a fern of deep, moist woods, has flourished in the author's windswept sea-level garden. *Lower Right*: The oak fern resembles the bracken in shape and habit but prefers richer, damper soil.**

est. Sharp-lobed hepaticas, on the other hand, must have neutral or only slightly acid soil, which is more likely to be found under stands of maple, hickory, butternut, ash, elm, poplar and basswood. Incidentally, this question of soil reaction is of vital importance to every wild flower gardener and should be thoroughly mastered. Actually, the subject is not at all difficult and enough can be learned in a few hours' study to meet all ordinary problems.

It is more difficult to transfer plants from your garden to the woods than vice versa — that is because you can pamper them in a garden but not in the woods. So season and method of transplanting are doubly important.

First as to season. Most early-flowering plants have completed their growth by about the middle of August and may be transplanted at any time from then till late October. Late-blooming species, on the other hand, are best taken to the woods early in the spring or in the late fall. Most ferns can best be moved in the early spring before their fronds are more than half grown, or in October or November when they are becoming dormant.

The method of transplanting is also of great importance. Water each plant thoroughly and deeply several hours before disturbing it. That will make the soil cling tightly to the root-mass. Then cut a deep circle around it and lift it with a generous ball of earth, so that the roots will remain practically undisturbed. If the plant is small, bag it in cellophane or some other moisture-proof plastic; or, if large, wrap the root-ball in wet material such as sphagnum moss, burlap or newspapers. Be careful not to break stems or fronds; tie them securely to a stake if the plant is large and also unwieldy.

Dig an oversized hole at the selected woods-site, line it with humus-rich soil collected nearby, set in the plant carefully, and protect it with a mulch of ground litter.

Newly-transplanted wild flowers must be kept damp till their roots have taken hold and gained volume. Therefore never set plants into dry woods, unless you can water them regularly and copiously for as long as necessary. Canopies of cheesecloth or mosquito-netting are helpful in retaining humidity around the newly-set plants.

It will be wise to furnish protection against pests as well as drought. Therefore, when the job of transplanting has been finished, place your favorite snail-and-slug poison under bits of bark around each plant and — in the spring or early summer — treat

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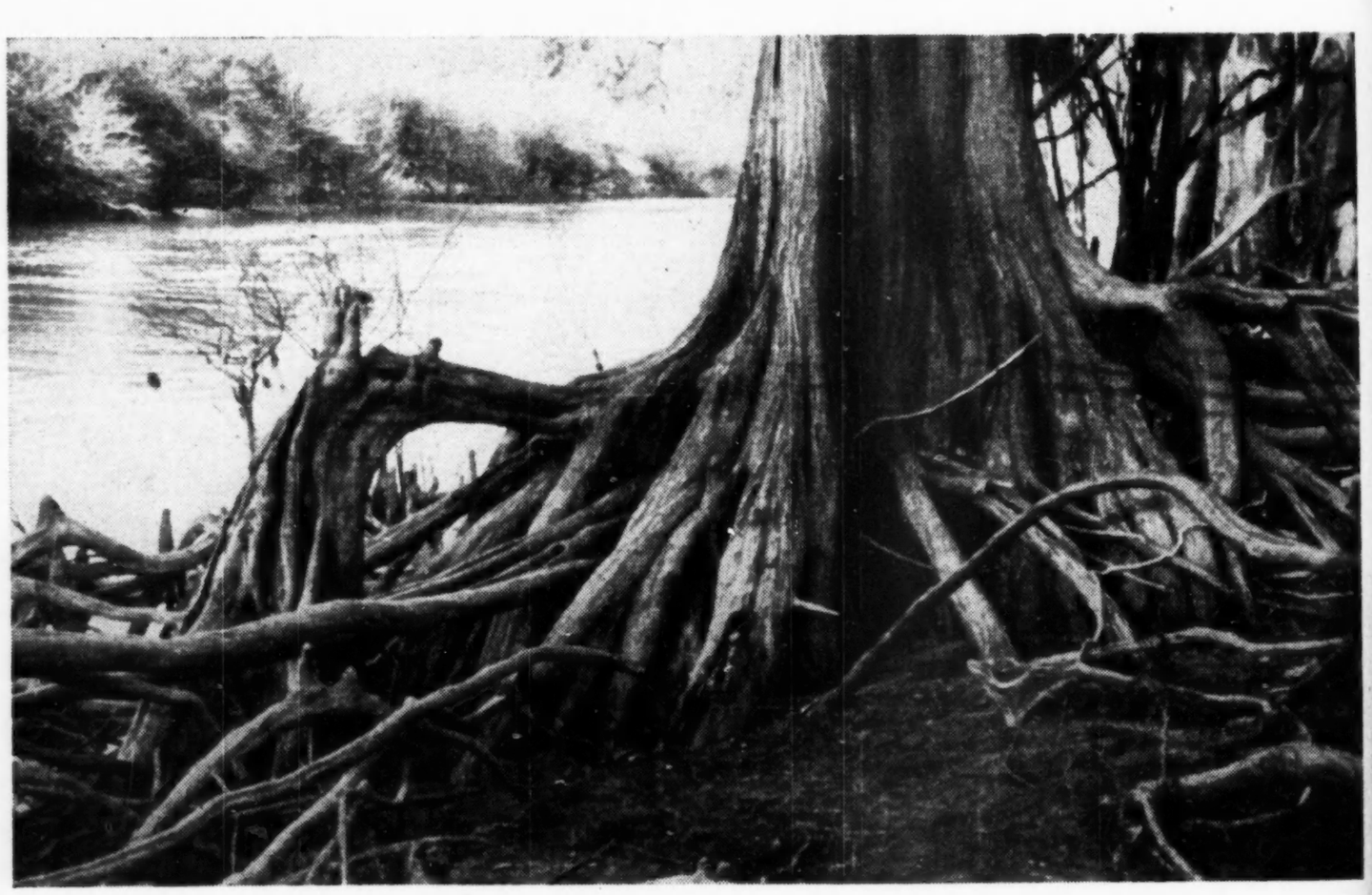
Cypress — —

The Tree Unique: The Wood Eternal

By Clair A. Brown

Wave erosion washed the soil away from the roots of these trees leaving them standing on stilts. The original soil level was just above the junction of the roots with the trunk.

Four oil-stained water marks are shown on the base of this tree. Notice the small knees just above the bend on the root mass to the left.



CYPRESS, *Taxodium distichum*, or bald cypress, as some prefer to call this tree, was once a dominant feature of the southern swamplands. Interest in cypress has persisted from the days when the early explorers were attracted to it by the peculiar outgrowths called knees. The early colonists found the wood easy to work and the passage of time demonstrated the superior lasting properties of the wood. Thus, cypress wood became highly prized and the demand for it has resulted in the almost complete destruction of cypress forests in areas easy to log. These characteristics of the wood, together with its unique growth forms, and the conditions under which it grows, have interested botanists, foresters and the general public.

Cypress was most abundant in the wooded swamps of the deep alluvial soils from Texas eastward along the Gulf Coast to Florida and northward into Maryland. It extends up the Mississippi Valley into southern Illinois and southwestern Indiana.

Let us visit a typical cypress swamp. The swamp is in a depression with a shallow margin and deeper interior. The swamp bottom is uneven and consists of a series of depressions and small irregular elevations. In the winter, which is the rainy season in Louisiana, the ground is usually covered with several feet of water and remains flooded until the new leaves begin to develop. The cypress seeds and seed balls float on the water and when the water levels drop, these seeds are stranded on the little elevations. The deepest depressions usually have water most of the year, but at times even these dry out.

Cypress trees along the margin of the swamp have less flare to the bases of their trunks and much lower knees than those growing in the interior of the swamp. Cypress grows with tupelo gum, a tree which also produces big buttresses. And there are smaller trees and shrubs which tolerate wet feet, such as swamp red maple, pumpkin ash

and Virginia willow. In general, there is very little herbaceous vegetation in good swamps because they are flooded so long in the spring that, by the time they dry out, the dense shade is not favorable for its growth. However, along the margin of the swamp there is a large variety of plants. When the forest is opened by the removal of trees or when it is drained, many kinds of plants enter the swamp, first on the stumps and logs, then on the small mounds and finally all over.

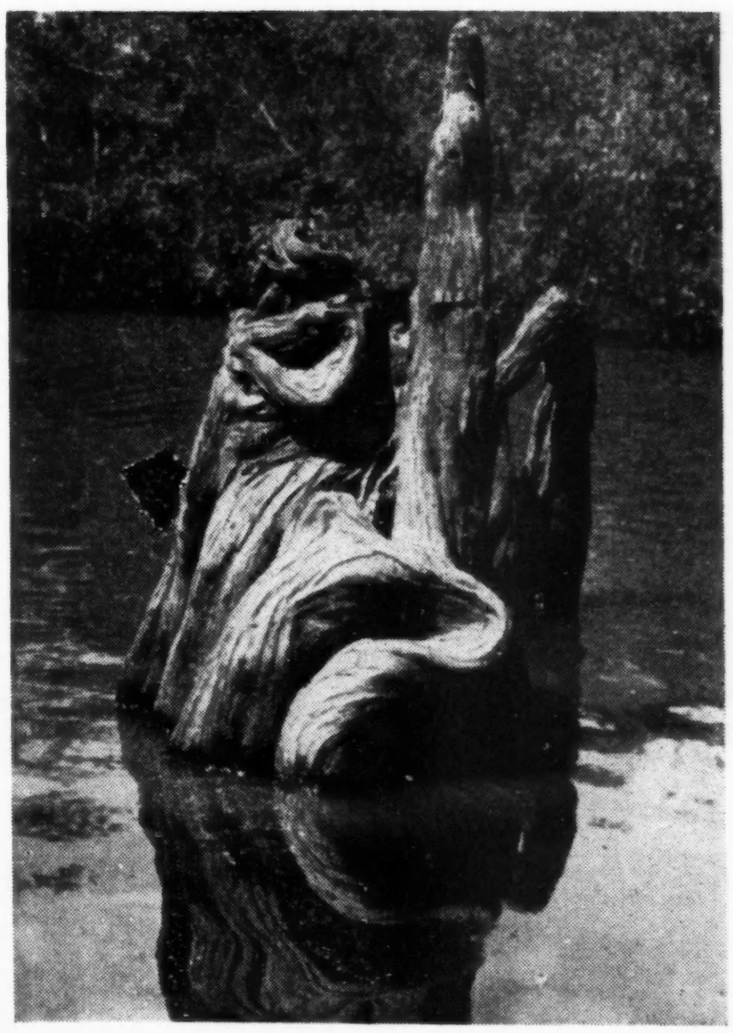
The growth of cypress in standing water has been a botanical puzzle to those not acquainted with the southern forests. This was intensified when research demonstrated that cypress seedlings could not grow totally submerged. Questions were asked. How do these trees re-seed an area? How do they get into lakes where the water is four to six feet deep? What is the explanation of trees in swamps which are flooded with six to ten feet of water and sometimes as much as twenty-five feet of water?

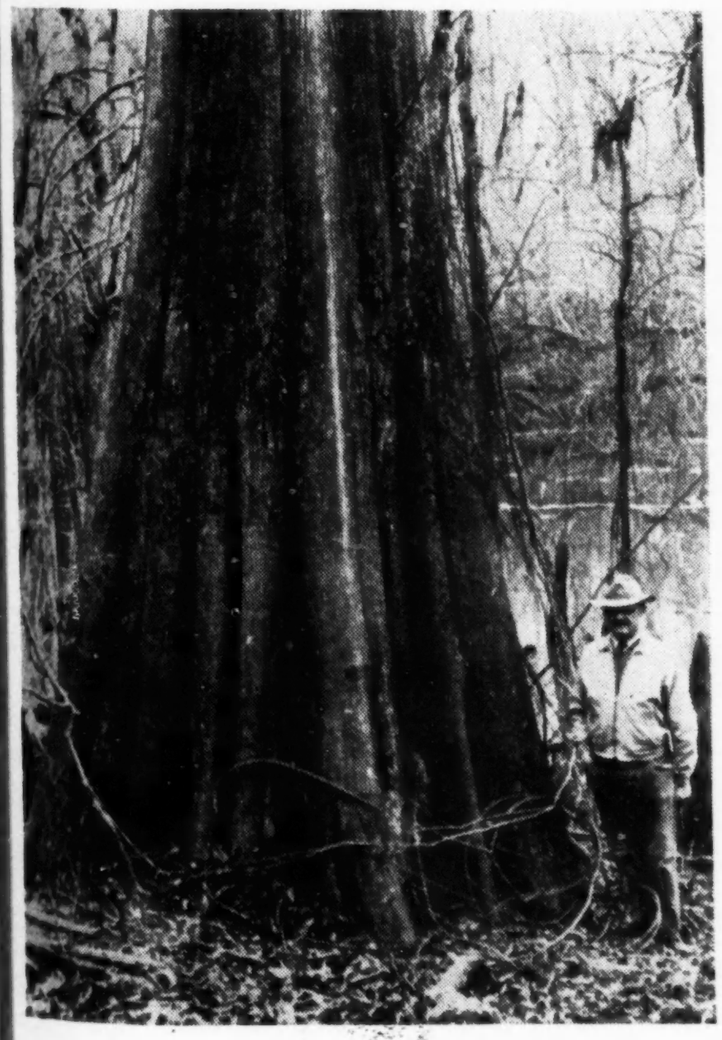
As previously mentioned, the cypress seeds and fruits float and are stranded at the margin of the highest water level as the water recedes. It is possible to follow through the swamps the contour of the highwater level by the line of drift containing cypress fruits. The seeds germinate and produce seedlings which can attain a height of six feet in one growing season. Thus, during periods of drought, seedlings may get started on sites which are usually slightly under water. If the tips of the seedlings are not submerged when the highwater comes again, then the seedlings will live. This explanation may not always account for the trees that stand in water around the margins of lakes and streams. A study of these sites will usually show that they are under water as the result of the erosion of the shore line, the subsidence of the habitat, or the blocking of drainage channels.

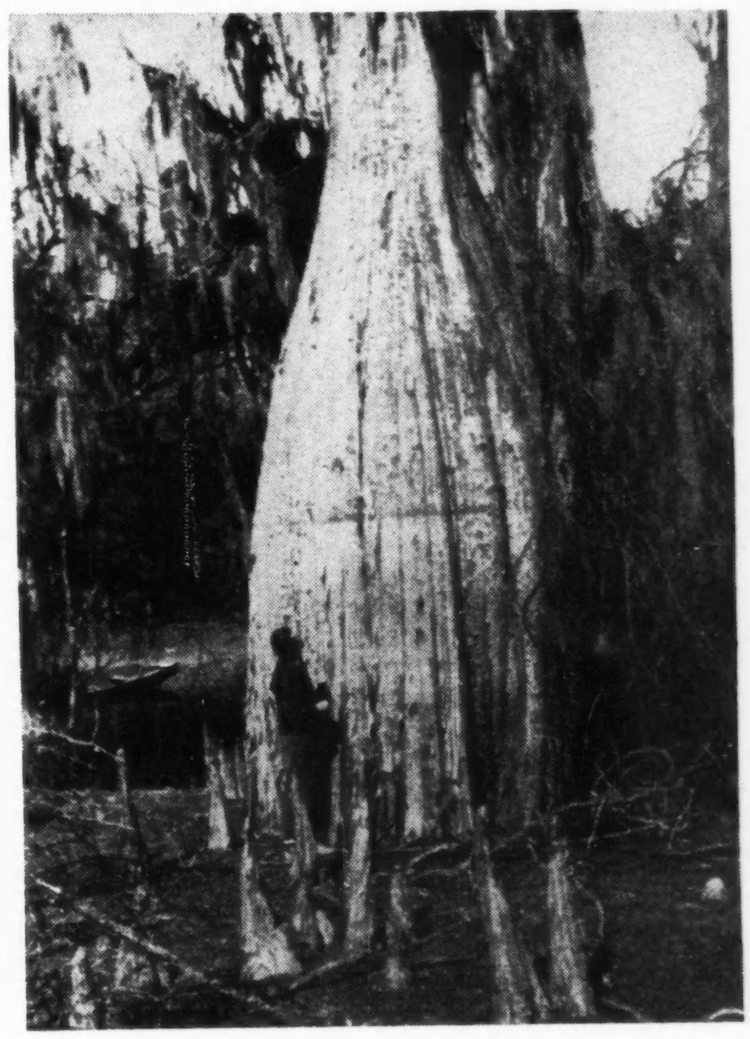
Cypress is usually considered to be slow growing and to attain great age. Some cypress lumber may show fifty or more growth layers in a board one inch thick. The growth rate of cypress was studied many years ago during the cutting of a virgin cypress swamp. These studies showed that it took a century for a tree to grow a foot in diameter or sixteen years to make a board an inch thick. This rate of growth was quite constant until the trees were over seven hundred years old, after which they made slower growth.

Botanists and foresters use a hollow auger, called an increment borer, to take a small sample or core from a tree. This core can be smoothed and the growth layers counted from which the age and growth rate can be computed without cutting the tree. I have sampled many cypresses and obtained growth rates which are quite different from the above-mentioned rate. Trees which have been standing in lakes for the last two hundred to four hundred years usually grow very slowly; sometimes it has taken fifty or more years to make a board one inch thick. Trees in swamps which are usually flooded each year can produce a board an inch thick in ten to twenty-five years. Trees which are only occasionally flooded have produced an inch of wood in three to eight years. I have found many trees about three feet in diameter, which are less than one hundred years old.

Cypress seedlings in the Louisiana State University forest nursery made a height growth of four to six feet in one season. These are too large to







ABOVE: **Although conical knees are typical, weird and grotesque forms are frequent. If you use your imagination you can see a figure of a lady holding a child in her arms, with one arm supporting the head.**

LEFT: **This cypress was 76 inches in diameter breast high. Its age was estimated at about 600 years.**

RIGHT: **This bottle-shaped cypress is growing in an area where there are marked changes in water levels. The height of one stage has left a conspicuous stain on the trunk. A fainter highwater mark can be seen about 2 feet above the dark stain.**

The hanging roots developed at a time when the water level was above this root zone for several years.

plant economically. About twelve years ago, I planted a number of these seedlings on high ground. Today, they range from one and a half to seven inches in diameter. The smallest is too close to other faster growing trees, which were planted at the same time. About twenty years ago, the Forestry Department planted a small cypress grove in a low area which was frequently flooded with a foot or so of water. This grove has made fine growth. These trees range from two to twelve inches in diameter; many of them are ten inches in diameter. This rate of growth, half an inch in diameter a year, is sufficiently fast to justify field planting by state and federal agencies.

These plantings show that cypress makes better growth on well-drained land, where there is an adequate supply of soil moisture, than natural seedlings do in flooded swamps. It is believed the reason cypress grows in swampy areas is that it cannot compete with other trees on the best sites. Thus, cypress could grow in habitats which are unfavorable for most other kinds of trees.

Throughout southern United States, one can find cypresses with a variety of trunk shapes, such as low truncated bases, conical bases, bottle-shaped and columnar trunks. These differences in shape and size have been attributed to the response of cypresses to flooding alone, to a water-air relationship and to the absence of aerated water during the early part of the growing season. Irrespective of the exact interpretation as to the causes which initiate these responses, most observers agree that the height of the buttress is related to the average height of the flooding. It must be emphasized that the upper part of the conical base usually extends above highwater marks.

Although the variation of the shape of the trunk is outstanding, the major claim for uniqueness comes from the outgrowths called knees. Cypress knees vary from a few inches tall to over six feet in height. A typical knee is somewhat conical, although malformed and irregular shapes are not rare. These knees have developed a regular bark except at the tip, where the bark is thin and usually orange-colored in living trees. The knees generally occur as outgrowths from the roots, although occasionally they may be found on the trunk some distance from the root crown. They are usually considered to be a part of the root system. However, the wood structure is similar to that of the trunk, but differs in that the cells have thinner walls, larger diameters and a shorter length.

The functions ascribed to these knees are twofold; first, a strengthening feature; second, an air-absorbing organ. Some knees occur just above the place where a horizontal root starts downward, and this is cited as strengthening the root at this place. However, many knees do not occur at such a place and thus this explanation does not apply to them. Most technical people accept the explanation that they function to secure oxygen for the root system. Inasmuch as the sides are covered with a thick, corky bark, the only place they can absorb oxygen is in the thin, live, orange-colored portion of the tip of the knee. A given tree will produce both low and high knees. The tips of the knees of average height are from one to two inches above the highwater marks on the trees. Also, in areas of shallow water, the knees are uniformly lower than in areas where the water is deeper. Thus, if knees are to function as air-absorbing organs, the tips of some must project above the average highwater levels in order to be of any use when oxygen is needed most. The function of the knees needs careful study.

On a typical cypress, the tiny leaves extend away from the branchlet in a feather-like arrangement. Now cypress is different from most trees that shed their leaves, for it sheds the tiny branchlets with the leaves attached to them. Cypress also differs from other cone-bearing trees in that roots are produced from the trunk, when it is buried in silt or submerged in water for several years. Cypress stumps sometimes produce a heal-collar on the cut stump and the cambium has stayed alive from fifty to one hundred years after the tree was cut. This feature has been observed in several areas where there are nearby uncut trees. Root grafts have been demonstrated for several species of trees, and the only feasible way to account for the fact that these stumps have remained alive is that the roots of the stump secured food from nearby trees by the means of root grafts. It does not seem possible that there is sufficient food stored in the roots to keep the cambium alive this length of time, in particular under conditions where most of the stump rots away.

Several years ago, a tree blew over into the crotch of another tree. These trees grew together — so much so at the point of contact that finally the top of the lodged tree died as the result of the girdling action. The bottom part of the lodged tree remained alive. Thus we have a condition where two root systems and trunks supported one top.

The lumber industry has stressed the durability of cypress wood in its advertising by the characterization of cypress as "the wood eternal". Cypress timbers used in the construction of houses, some two hundred years ago, are just as sound today as when they were installed. The early water mains

of New Orleans were made of cypress logs hollowed out and bound with iron bands. Excavations have uncovered these cypress pipes which were buried over one hundred years ago. The wood shows no deterioration. The heartwood of cypress is more resistant to decay than the sapwood. Apparently the wood of the old, slow-growing trees is more durable than that of the fast-growing trees.

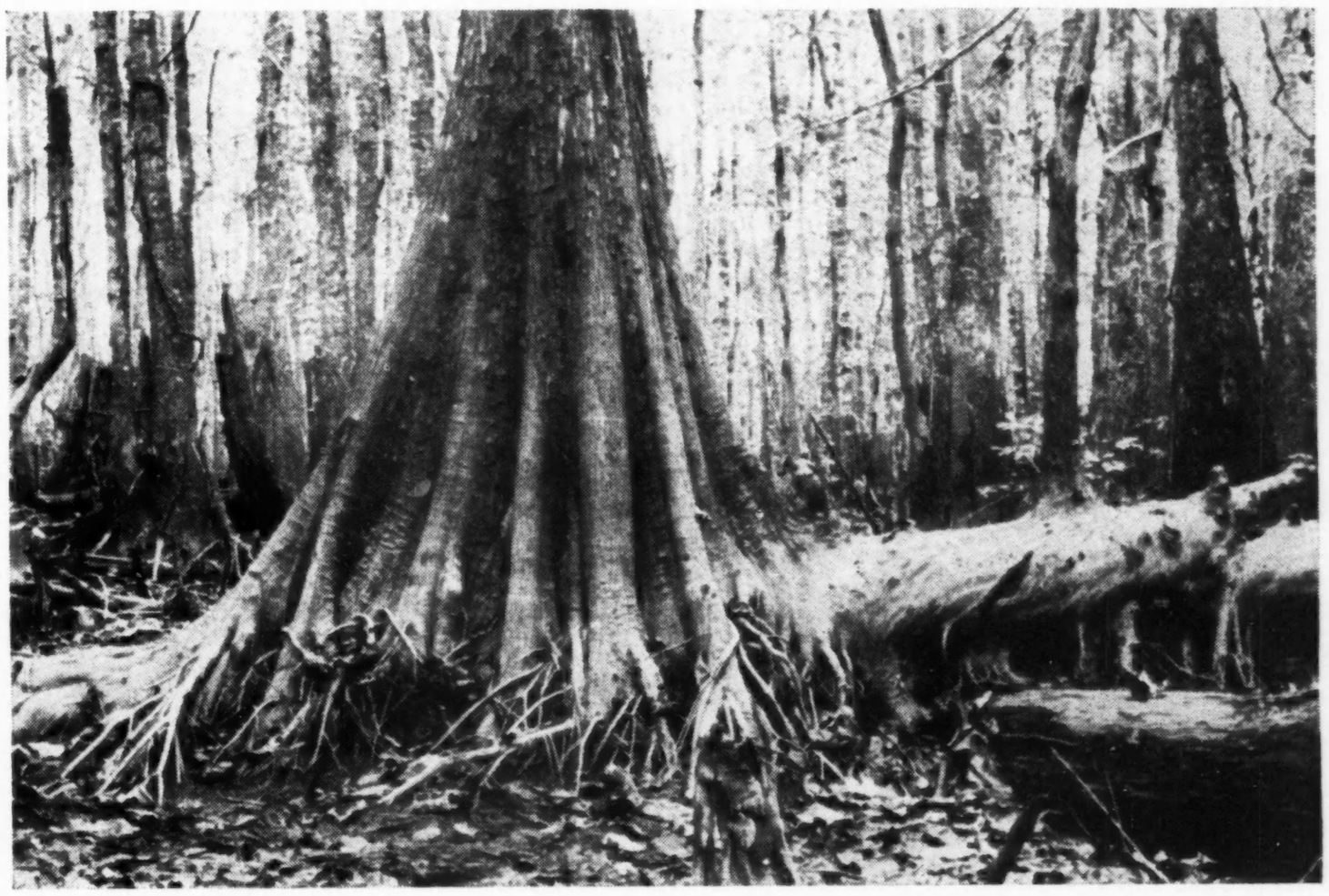
Although cypress is very resistant to wood-rotting fungi, it is by no means immune. There is one fungus which makes little irregular holes or pockets in the wood. Wood with these holes in it is called "pecky cypress." It is more resistant to decay than sound wood and is selected for special uses. The fungus which causes these pockets produces a toxic compound which kills itself and protects the wood from invasion by other fungi.

Cypress held a place in the economy of the early settlers in the South comparable to that of white pine for the inhabitants of the northeastern states. The soft, easily worked wood had a multitude of uses. It was used for the main construction timbers of houses, siding, flooring, interior trim, window frames, cupboards, armours and other articles of furniture. Cypress logs were hollowed out by the Indians for boats. The pirogues of the early settlers and trappers were also dugouts. Today, the name pirogue is also applied to the small, tricky boats made from sawn cypress boards. In some sections of Louisiana, one can see shakes — hand split boards used for shingles—and picket fences which are from fifty to one hundred years old and still in good condition. Today, cypress is used where its durability and lightness are major items, such as greenhouse benches, sashes, cisterns, porch floors and siding. Considerable quantities of cypress have been used to make boxes in which to ship window glass.

The above accounts have mentioned certain unusual and unique features of cypress. There is a legal aspect which must be mentioned. In early colonial times, streams and lakes were the highways for traveling from one place to another. Laws were passed which enabled travelers to use streams for navigation and floating of logs under certain conditions, irrespective of the wishes of adjoining property owners along their banks. The State of Louisiana retained title to the beds of all navigable streams and lakes when it entered the Union in 1812, as the streams were the public highways of that time. Since then, Louisiana laws have defined the state ownership of the bottoms of navigable streams and lakes as ending at the mean highwater level.

Many of the early surveys were made at a time when the land had a value of fifty cents an acre and often the surveys were not precise. Since then, the land has increased in value, especially where there are possibilities that there may be a potential oil field underground. In areas, where there are no stream gauges to establish the mean highwater level, this level must be established from a study of the geology, topography and vegetation. Inasmuch as the height of the knees and the shape of the bole are responses related to water levels, it has been possible to use cypress as an indicator for determining the boundaries of lakes. One lake has an annual fluctuation of twenty-five feet and sometimes even more. From the variations in the growth of the cypress it has been possible to pick the mean highwater level. Cypress is just as usable in lakes which have a change of water levels of not more than two to four feet.

The Louisiana law and courts have not determined what constitutes a navigable stream, so that navigability of each stream must be determined on its merits. Streams change their courses, partially fill up, and what today is a mere trickle may have been a navigable stream in 1812. Also, surveys were made in the winter when the lands were flooded and the width of the streams was often recorded wide enough to suggest a navigable stream. A recent examination of one certain stream revealed that the stream is only a few inches deep and so small that one can step across it eight months of the year. This stream may flood to a depth of several feet in winter as the result of back water. In these instances, the position of the cypress is used to establish the location of the channel and the ages of the trees are used to date the channel. When the channel is narrow, shallow, and there are stumps in it, the Louisiana courts have generally ruled that the evidence indicates the streams were non-navigable. Thus cypress not only responds to its environment and changes in it, but is also a witness to these changes.



Here is a tree which has developed from a branch of the fallen log. At the right of the picture the original trunk is broken. Roots have developed from this log and small knees can be seen on top of it. This irregular fluted base is common on cypresses in deep swamps.

Vaux-Le-Vicomte

A Country Place on a Magnificent Scale

By Paschal Campbell

Had Louis XIV and Hollywood moguls been contemporaries, they would have vied in affluence and influence. Production was the foreword in the court of Louis and even now it takes superlatives to describe some of the spectacles. His attempts to amuse, delight, overwhelm and surpass each successive try involved all the contemporary talent and resources that he could lay his hands on. These, of course, included the playwrights, architects, artists, writers, sculptors, besides every beautiful woman in the kingdom. Their only pastime was to be amused and let it be said that Louis XIV never shirked this royal duty. And he almost never failed.

The national treasury was only too handy and fostered no more of a challenge than a new love affair. After all, he was king. It was talent that Louis searched for and found in great abundance. The great stage names, artists and playwrights were numbered among the court. It had become fashionable to surround oneself with the very latest in the literary and theatrical world. But it was only after his Minister of Finance set out to build himself a country place, that Louis really began this business of being *Le Roi du Soleil.*

The Minister of Finance, Fouquet, by virtue of his personality, seemed to exhibit the spirit of his time. This was characterized in his arrogance and autocratic defiance. A patron of the arts, and extremely successful financier, Fouquet was *le maitre* and Louis the pupil, although Louis never acknowledged it.

At the beginning of 1650, Fouquet arranged a contract with the architect Le Vau and started his country place. Since his viscount was in Melun, he chose a site not far away. In order to clear ground for the castle, gardens and surrounding lands, Fouquet purchased and pulled down three villages.

Possibly, it can't be truthfully said that Louis was unaware of all this. But he certainly paid little, if no attention. He was enmeshed in his love affairs and a social life that hardly left time to worry about nothing more than a new estate belonging to Fouquet. Life was gay and there were so many things to do. A spirit of discipline ran through the society, which was manifested in the fashionable life by an etiquette cultivated to the very extreme of refinement. On the other hand, this was balanced by a constant search for novelty, change and opulence. Variety was the only relief and a never-ending search resulted in royal fetes on a magnificent scale. Everything had to be magnificent — and new: the costumes, exercises and fireworks, and Molière must certainly have worked overtime, for he was constantly producing a new play for the next fete.

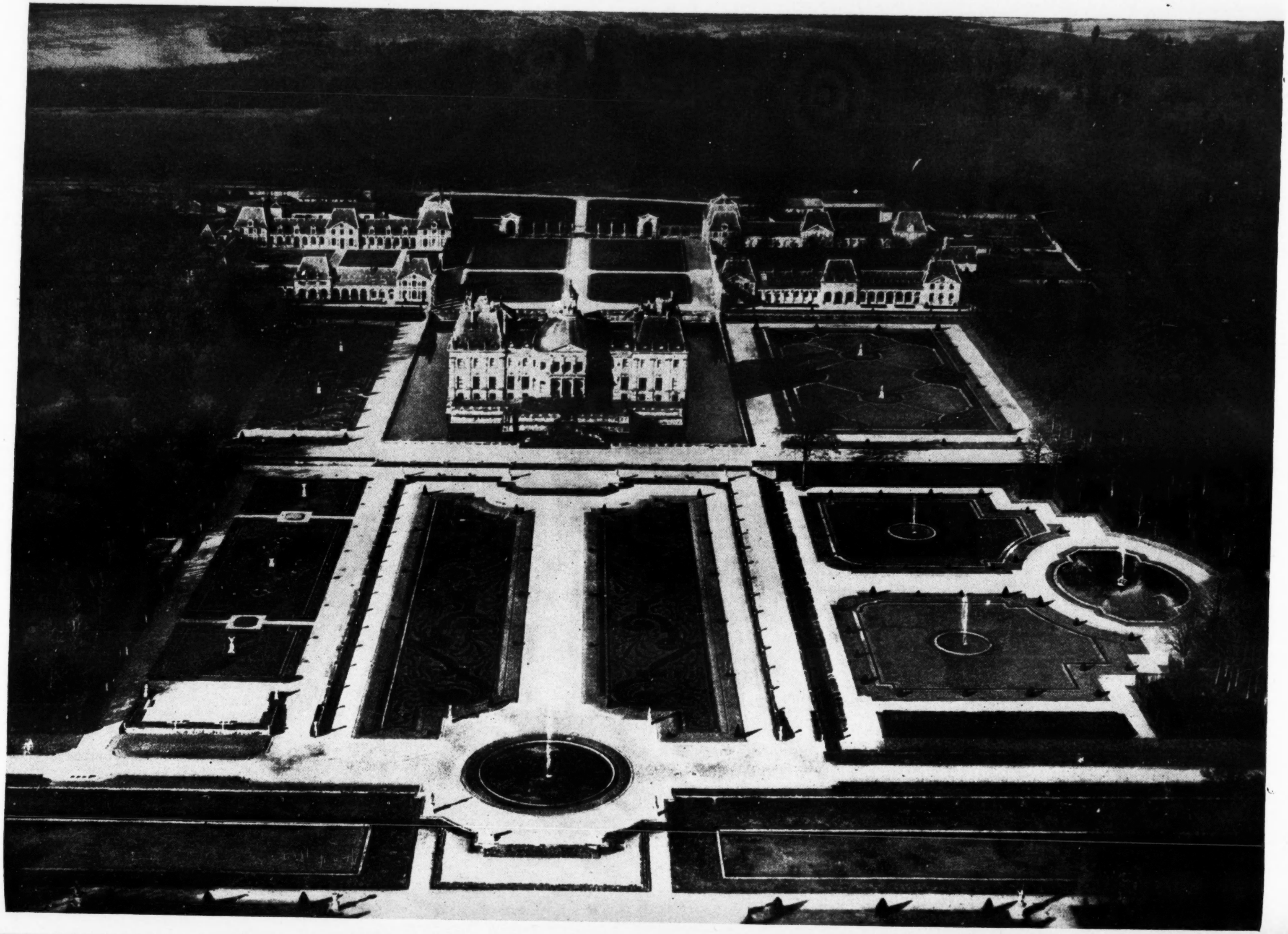
Fouquet was no less taken with the merry-making than everyone else. It is certain that he had before all things in mind the creating of Vaux-le-Vicomte as an unsurpassed setting for those wonderful fetes. And he certainly didn't spare the horses. It is said that at times as many as eighteen thousand laborers were employed together and the cost was computed at sixteen million livres. After asking Le Vau to plan the castle, Fouquet secured Charles Le Brun to decorate it. In turn, Le Brun recommended his young friend, Le Notre, to construct the gardens. This turned out to be no mean choice.

Le Notre and Le Brun had studied painting together under Simon Vouet and Le Brun admired his imaginative fancy in decoration and his knowledge of garden art. The last he was more than familiar with; his father was superintendent of the Tuileries Gardens. Le Notre, perhaps because he lived on the fringe of this courtly activity, seems to have been imbued with the two currents of thought uppermost in men's minds. The spirit of discipline he exercised in subduing nature and the countryside with his vast vistas and immense projects. After all, he was building these gardens as a setting for those huge affairs which were not only attended by thousands of people, but had to provide a background for their elegance and sophisticated tastes. Variety was demanded and must be provided.

Up until this time, a severe axial order was the foremost idea. The parterres were exactly alike, the terraces presented the same or similar pictures, and symmetry was marked in the repetition of the same lines. At this time, when the Italian influence began to be felt in a new direction, there was no real mastery of the novel

A general view of the chateau de Vaux-le-Vicomte and its extensive grounds.

These elaborate gardens provided an elegant setting for lavish fetes attended by thousands of people.



idea of the whole and its parts. Not until Le Notre projected his ideas in Vaux-le-Vicomte. He perceived that the most important thing was to create a magnificent scene which could be seen as a whole from the house and demanded this before anything else. Its main lines might be permitted all sorts of variety in parterres and in water, but everything must be seen. For here the most lavish court in the world would gather to wear the latest styles, see the latest plays, engage in the latest intrigue, pursue the latest pastimes, and exchange the latest gossip.

Such a scene demanded a frame and Le Notre supplied it by shrubberies that each separately constituted a private garden, in which more and more variety would be found to answer the extravagant demands. Le Notre did not forget a frame for the whole picture. Each side of the huge garden is bordered by plantations of trees, which are set on higher levels and thereby enclose the complete picture and act as a subtle barrier to keep the eye from wandering about the countryside.

Mademoiselle de Scudéry said soon after the place was finished, "The most wonderful thing is how this garden lies between two shrubberies, which agreeably break the view." One author has given Mademoiselle de Scudéry credit for being a fine observer. Another says that she mixes and confounds all. We are inclined to agree with the first in this particular case. In order to guide the view outward and down the main axis, Le Notre chose an admirable element — water. He bordered either side of the central walk on the second terrace with pools and in them put jets of water close together so as to form a balustrade of crystal on either side of the avenue. How could any eye wander from between such delightful captors? The eye goes down this allee, past the main canal which is set perpendicular to the main axis and at such a level to be invisible from the house. Directly behind the canal is a small hill and from the last mentioned allee, the eye starts up the hill on which are found a statue of Hercules, a grotto and cascades.

The cascades are a prime example of Le Notre's ability to furnish something new and novel. They must have been the subject of conversation for at least two weeks or until the next parterre was worked out. As viewed from the steps of the castle terrace, which land on the first terrace, these marvelous cascades seem to disappear into the pool which lies at the end of the first terrace and is actually more than a kilometre away from the cascades. Only someone with great imagination and a knowledge of engineering could have accomplished this optical illusion.

All of this could only have been conceived as a background for a court, yet the remarkable thing is that it was conceived with such taste and perfect handling of scale. As French gardens of that period go, Vaux-le-Vicomte is not considered large. Yet it extends over a kilometre from the castle and still retains a feeling of intimacy in detail for which the French people were so famous. Since it was built for thousands of people to wander about, it never looks complete until these people are present, wandering leisurely back and forth, giving the whole picture a gentle movement. Fouquet had fallen on the right man and could hardly wait until everything was ready. Finally, in the summer of 1661, he gave his first great fete in honor of the young, much admired lady, Henrietta, wife of the Duke d'Orleans, the king's brother.

Meanwhile Louis' prime minister had died and Louis had decided to be his own prime minister. Colbert, another member of the cabinet, had wormed his way into Louis' confidence and was doing everything to bring on Fouquet's downfall. Colbert visited the estate secretly and took back his own version of the immense number of workmen and the enormous sums of money being expended. Since Fouquet was Minister of Finance, this did not speak well at all.

The fete was held and was a huge success. Le Notre had not failed Fouquet, although for some reason the king was not there to bear witness to this. He did hear stories of the affair which excited his anger and greed. Such magnificence belonged to him. So another party was arranged to which the king had promised to come, so that he could see with his own two eyes how Fouquet was mocking him with such an estate.

His eyes did not deceive him. He was infuriated at such splendor that he had not been able to equal. After the feast, Moliére's piece, "Les Facheux" was given in the theater erected at the end of the avenue of pines. Moliére had written it especially for the festival in only fifteen days. Le Brun had painted the decorations, and Pélisson, the well-known prose writer, had composed a prologue for it, which was recited by La Béjart, the best actress of the day. After the acting came the fireworks display, which caused the greatest enthusiasm.

By this time Louis was fit to be tied. When the fireworks caused the horses, belonging to the Queen-Mother's carriage, to shie and drown in the great canal, it was all too much.

A few weeks later, Fouquet was arrested on some trumped-up charges and thrown in prison by a jealous king who hated and would not forgive him. He barely escaped a death sentence and his doom of exile for life was commuted to life imprisonment.

Although our sympathies might lie with Fouquet, we must admire Louis' taste. He had seen enough of Vaux-le-Vicomte to know that its creators were masters of their arts and had no equals in the world. Lately he had been thinking of doing something with Versailles, a small hunting lodge in the country. He took the only logical step in order to heal his wounded pride and asked Le Vau, Le Brun, Le Notre and the other artists involved to create Versailles, as we know it today. This is the Versailles that was copied all over Europe and envied all over the world, but never equalled in any way.

Since Vaux-le-Vicomte introduced Le Notre upon the scene of landscape architecture, its worth might be assessed by this and forgotten. This would be a rank injustice. Vaux-le-Vicomte is a gem in its own right. Its functional value ended when *Le Roi du Soleil* died, but its exquisite design, its spectacular use of water and its noble lines exist as its own best exponents.

The toe-toe, *Arundo conspicua,* closely resembles the pampas grass of South America, though its plumes are more graceful.

PLANT LORE OF THE MAORIS

By A. W. Anderson

AWAY back in the eighteenth century, when regulations were being drawn up for the administration of the recently established colony in Australia, the Governor was instructed that, in the case of really serious crimes, the criminal was "to be confined until opportunity occurred of delivering him as a prisoner to the natives of New Zealand and let them eat him."

Thus we see that in civilized eyes New Zealand symbolized primitive man at his worst. We now know that although the Maoris were cannibals without knowledge of either script or of iron, they were not merely wild men of the woods but lived in a highly organized society where the rigid and all-powerful code of Tapu — which became anglicized as "taboo"—governed their every action from the cradle to the grave. The god Tane was the beneficent father of all and the Tohungas, or priests, administered the rules of the dreaded code of Tapu.

The toe-toe, *Arundo conspicua,* serves as a constant reminder that the decrees of Tane must be obeyed. It closely resembles the pampas grass of South America although the loose, waving plumes have none of the stiffness of that plant. In the days of long ago when it grew stiff and erect, Rata, one of the ancient Maori heroes, went into the forest to choose a tree for the purpose of making a dug-out canoe. He chose his tree, felled and trimmed it without reciting the necessary incantation, asking permission from Tane. He had to be taught a lesson. That night, when he went home, Tane arranged that the spirits of the forest should replace the tree. Imagine how astonished Rata was next morning to see it growing as before and to have to fell and trim it again.

When this had happened three times, Rata became both annoyed and uneasy and decided to hide in the forest to learn what was happening. He sprang out when the tree was in the process of being replaced and roared with rage. This, with the crash of the falling tree, made such a noise that all the forest creatures trembled and the toe-toe hung its head in fear. The spirits firmly announced to Rata that he could not get away without reciting the incantation and he solemnly vowed that he and all his people would never again be guilty of such impertinence. But the toe-toe hangs its head to this day as a reminder that the wrath of the gods will surely descend on all who wantonly destroy the children of Tane.

The lore of the Tohungas included a knowledge of the beneficent uses besides the poisonous properties of plants, a harvest of observation and experience that had been handed down orally from the earliest times. Only young men of rank and position were admitted to the special schools in which the tribal lore was taught. These were known as the "Whare Whananga" and had as their emblem the "Pua Whananga" or bush clematis, *C. indivisa.* Ancient tradition says that when the first Maori canoes came to New Zealand, the voyagers, on seeing the starry white blooms over the dark green of the evergreen forests, recognized them as flowers sacred to their ancient lore and knew that they had reached a new homeland.

The coming of the Great Fleet, c. 1350, has all the ancient glory of the arrival of the Pilgrim fathers in America or the Norman conquest in Eng-

land. And here, too, the best people can trace their ancestry back to a famous migration. The sailing of the canoe "Arawa", which gives its name to one of the most influential tribes, seems to have been precipitated by a boyish prank — the robbing of an orchard. Kama te Kapau and his young brother stole the fruit from the Tohunga's bread fruit tree, using stilts so that their footprints would not be recognized. Nevertheless, they were seen and identified.

When the story was told to Kama's descendents in New Zealand, the bullibulli, *Solanum aviculare,* was substituted, probably because its fruits were the most luscious of all native fruits. It is a handsome shrub with inch-wide, violet-colored flowers followed by golden-yellow damson fruits, used by the early white settlers for making jam. It had a high place in the Maori drug store. The outer bark was scraped off so that the juicy inner layer could be pressed for the sake of the sap. This was used as a cataplasm for ulcers and for scabies, after the infected part had been softened with shark-liver oil. This expressed sap was also an important ingredient in the red paint for canoes and carved doorways, as it was believed to prevent fading. A healing ointment, said to have been of great value in a land where the national sport was tribal war, was made by pounding the crisp young leaves and mixing them with other herbal oils.

Another plant connected with the Great Fleet was the tainui. This is also a common plant in Australia, where it was found and described by LaBillardiere in 1792, as *Pomaderris apetala.* An ungainly shrub of fifteen feet or so, with dark wrinkled leaves and long panicles of dingy yellow flowers, its presence in New Zealand was unknown until it was discovered by Sir James Hector in 1878. He described it the following year as *P. tainui,* because of a legend told by the local Maoris. They said it grew only in that one locality, as it was the progeny of the skids which had been brought from the ancient Maori homeland, Hawaiki, in the canoe "Tainui."

Sir James believed the story and thought that if it could be found in some other land, the original home of the Maoris would be known for certain. Unfortunately, when the frail gossamer tales of long ago meet the cold airs of science, they do not always stand up to the test. The tainui was found in other parts of New Zealand and, when it was identified with the Australian species, the old legend proved itself worthless — because the one land in the Pacific which had no connection with the ancient Maoris is Australia.

The closely related *Pomaderris elliptica,* usually known as the golden tainui on account of its glorious clusters of golden blossoms, was a great favorite with the Tohungas. They credited it with many virtues and regarded it as a sovereign remedy for all lung troubles. It is said to be among the principal ingredients of certain popular herbal remedies dispensed by modern herbalists. In olden times, the Maoris from all parts of the country made annual expeditions, either overland or by canoe, to the far north for the purpose of collecting the newly opened flowers. The trusses were put into water, in gourds, heated by means of dropping in hot stones, in order to make the precious infusion, which was taken home and guarded by a strict Tapu.

Another example of the workings of Tapu is given in the story of the unfortunate Marama, a lady of rank, who sailed in the "Tainui." She seems to have been in charge of the food plants and, as a punishment for being a bad girl, had all the plants turned valueless. Thus her gourd seeds, of the best sort in Hawaiki, changed to the useless New Zealand gourd, *Sicyos angulatus;* her paper mulberry, brought for the purpose of making clothes, came up as the whau, *Entelea arborescens,* whose leaves are not unlike, but whose bark is quite useless for making cloth; but the greatest punishment of all — her kumaras were changed into the weedy *Convolvulus tugurorium.*

The kumara, known throughout the rest of the world as the sweet potato, *Ipomaca Batatas,* was a staple food and its loss was serious. Several efforts were made to re-introduce it, but all were unsuccessful. In time, even the memory of such a food seems to have died out. Then two wrecked sailors were cast up on the New Zealand shores. They were Taukata and his brother, Hoaki, who had been blown far off their course from Hawaiki. Taken to the nearest village and cared for by a chief's daughter, they showed great distaste for the food offered. Taukata asked for a gourd of water and, taking some material from his belt, made a gruel. He requested his hosts to taste it. They were delighted with the sweetness and, on inquiring what it was, were told that it was kumara from Hawaiki.

An expedition set off to bring kumara to New Zealand. The brothers showed their hosts how the plant should be grown, harvested and stored so as not to bruise the tubers. A special storehouse was built to house the crop. After it had been stored, Taukata was killed and his blood sprinkled over the door to prevent the vital essence of the kumara from returning to its homeland. To make assurance doubly sure, Taukata's skull was placed in the storehouse to guard the crop. In the spring of the year, two small kumaras were placed in the eye-sockets and the skull was conveyed to the kumara gardens with great ceremony and left to guard the growing crop.

Spring Chasing

Continued from page **33**

heads; it was as cold as the inside of an ice house. Now we had spring by the nose, but only momentarily, for upon emerging from the pass the "white-throat" and winter wren greeted us with song and trees were all in leaf in this tumble-turvy spot of echoes, huge boulders, upturned tree stumps and a trail which led through rock tunnels and over the water on "hitch-up Matilda" bridges. No matter, we would search farther tomorrow. Spring may have come to the lower levels but not to the higher places. We would try Mt. Marcy.

An early start seemed advisable, since snow and ice had been reported on the trail. As we swung down the path, Werner recalled that just a year ago he had had his last view of his native Alps from the window of the Simplon-Orient Express, when he began his journey to this country. On this first anniversary, he was learning to know these much older mountains with worn-down peaks but with denser and more extensive forest wildernesses than found in the alpine terrain. Vesper sparrows and bobolinks were singing in the fields at the bottom of the

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MAGNOLIAS

By J. H. Beale

The Kobus magnolia in full bloom at The New York Botanical Garden.

AMONG the magnolias are some of the most beautiful flowering trees and shrubs of northern gardens. From their number, one may select a species with flowers almost a foot in diameter, or another in which they are hardly three inches across. The leaves show similar contrasts in size, varying from four to thirty inches in length.

The hardier species are natives of the United States or of Japan and China. Some bloom on leafless shoots, others with or after the appearance of leaves. In many of them the three sepals assume the shape and color of the petals, though they are not always as large; in others there is a distinction in size and color, or again the sepals fall soon after the flowers open. The cone-like fruits are often large and colorful and, as they ripen, the seeds hang down on threads for a short time before they fall to the ground.

Magnolias require a moist but well-drained soil containing an ample amount of organic matter. They are often grown in association with rhododendrons and related plants and thrive in the peaty soils generally provided for this group. Peat is not essential, however, as is evidenced by the many excellent specimens growing where peat has not been used. Leafmold and old cow manure will give equally satisfactory results. Locations protected from cold winds, but where the air drainage is good, are particularly desirable for those that bloom early in spring or approach the limit of hardiness in this section.

Magnolias have the reputation of being difficult to transplant. There is justification for this; sometimes they make very little growth for a season or two, after they are set in the garden. Spring, just as growth begins, is the best time to plant and always they should be moved with a ball of earth attached to the roots of sufficient size to ensure the least amount of root injury. Until they are well established, they must not suffer from lack of water during periods of summer drought. A mulch of manure or hay over the root area is very beneficial.

For practical purposes, the season of magnolia blossoms may be said to open with the star magnolia (*M. stellata*), one of the more familiar kinds. This native of Japan is a bush seldom of greater height than ten to twelve feet. The large woolly flower-buds are conspicuous all winter and open into white, fragrant, four-inch flowers made up of twelve to eighteen narrow, strap-shaped petals. The leaves come later and are about four inches long, and half as wide. The plant is quite hardy and flowers profusely and regularly, and if the first flowers are blackened by frost or cold winds as, unfortunately, all the kinds that bloom precociously are apt to be, given a few mild days the unopened buds will still provide a display.

The pink-flowered forms of the star magnolia, variety *rosea* and "Waterlily", are not quite as well known. In the former, the outside of the petals is a delicate pink which disappears as the flowers mature. It has more petals than the type, and the plant has greater vigor. "Waterlily" is similar but a more pronounced pink.

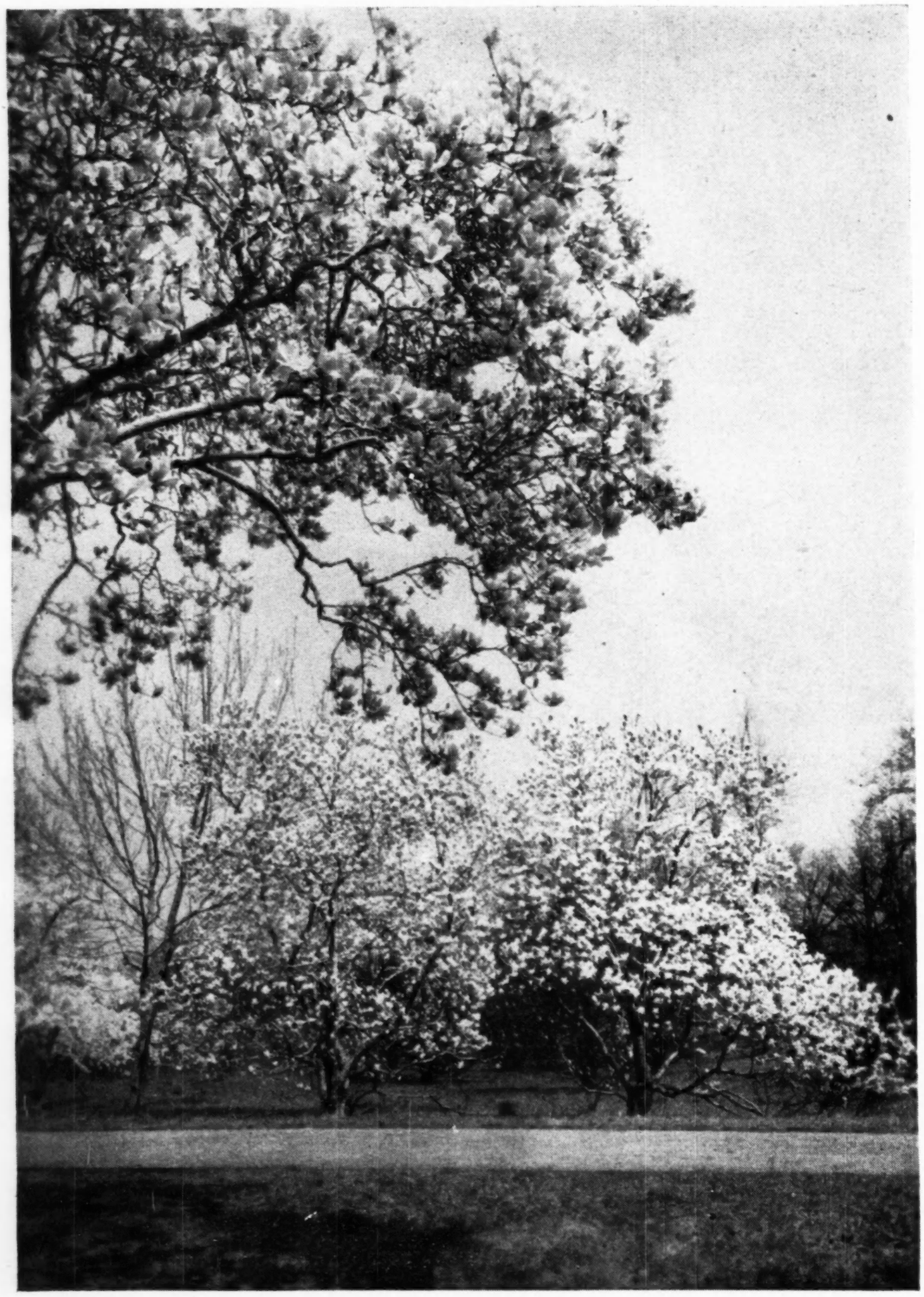
The Yulan (*M. denudata* or *M. conspicua*), which came from China, blooms at approximately the same time as the star magnolia, but eventually it will become a tree of twenty-five to thirty feet. The white flowers of nine broad petals are sweet scented and about six inches across, and the leaves, broadest above the middle, some six inches long. Because of the size of its flowers, it is probably the most striking of very early flowering trees.

Still comparatively little known is the anise magnolia (*M. salicifolia*) from Japan, yet another of those blooming before the leaves appear. It is a small, upright-growing tree with rather thin branches, and leaves four to five inches long and a third as wide. The flowers are fragrant, white, of six petals, and four inches in diameter.

However, the anise magnolia does not create as good an effect as the star magnolia.

Another Japanese species with flowers very much like the previous though rather smaller, is the Kobus magnolia (*M. Kobus*). The flowers have six, or occasionally nine petals which often have a reddish marking at the base outside. The four-inch leaves are broadest in the upper half. It can be very readily propagated by summer cuttings. This magnolia forms a very large bush. The variety *borealis* is the tree form; it grows more rapidly, begins to flower at an earlier age, and is said to be the hardiest of the Asiatic magnolias. Both the flowers and leaves of *borealis* are rather larger than those of *M. Kobus*.

The saucer magnolia (*M. Soulangeana*), in one or another of its various shades of color, is known to everyone. In fact, it is probably the only one recognized as a magnolia by many who do not take an active interest in plants. It deserves popularity for the profusion of its flowers, which are shades of purple or red extending upward from the base of the petals, but becoming paler as they merge with the white background. The inside of the flowers is white. Coming, as they do, on leafless stems the large fleshy petalled blooms command admiration. Frequently a second, but smaller crop is produced in August.



A trip to The New York Botanical Garden in magnolia time will enable the visitors to see all the species described here.

Of hybrid origin (*M. denudata* x *M. liliflora*), the saucer magnolia is one of a number claiming the same parentage. But it may also be raised from seed, and the shape and coloring of plants under this name is far from uniform. Some of the best of these forms have received names, but in order to retain their particular characters they must be vegetatively propagated. The flowers of these clons range in color from white through light to dark shades of purple.

Lennei is one of the most outstanding of these varieties, and the flowers, as much as six inches long, are rose-purple at the base. The petals are very broad, spoon-shaped, and white on the inside, and the leaves are larger.

The lily magnolia (*M. liliflora*), originating in China, is a loose open bush, and not reliably hardy in this area. Its somewhat hardier variety *nigra*, which was introduced from Japan, is more frequently found in gardens, generally under the name of *M. Soulangeana nigra*. It has large very dark purple flowers, of a lighter shade inside, that are produced over several weeks, with and after the development of the leaves.

The native Fraser magnolia (*M. Fraseri*) can be distinguished by the two rather narrow lobes at the base of the leaf blade. The leaves are crowded at the ends of the branches, and up to eighteen to twenty inches in length. The opening six-petalled flowers are pale yellow, but turn white on maturity. They appear after the leaves, a feature common to all the North American magnolias. The fruits are red, five inches long.

For a tall, handsome tree probably no other magnolia can excel the native cucumber-tree (*M. acuminata*), and it is the hardiest of all. Unfortunately,

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CONTROLLING CRABGRASS

AND OTHER WEEDS WITH CHEMICALS

By P. P. Pirone

At one time or another, nearly every home owner tries to grow a beautiful lawn. Except for a brief period at best, few ever succeed. Why? With some, it is simply a case of neglect. In the majority of cases, however, it is the result of some faulty practice during the growing season.

Crabgrass Most Troublesome

The most common cause of lawn failures in this part of the country is the pesky annual weed called crabgrass. Actually there are two distinct species; the smooth and the hairy crabgrass. Both are equally troublesome, and in this discussion are treated as one.

Crabgrass starts anew from seed in late spring. Seedlings grow most rapidly during the summer when the permanent grasses are relatively dormant. Thus by late summer, the spreading crabgrass plants practically overrun the better grasses. They mature in early fall, dropping seeds for the next year's crop by the millions. With the first frost, crabgrass is killed, leaving the areas occupied by it brown and bare. It is only then that most home owners realize for the first time how completely crabgrass had taken over.

The only green remaining after the first frost are the few blades of Kentucky bluegrass and other permanent grasses that survived the intense competition. Such blades, of course, continue to grow well into fall and again early the next spring when there is no competition from crabgrass.

Chemicals May Help, But —

You are aware of the great amount of publicity and advertising in the past two or three years on chemicals for controlling crabgrass. There is no doubt that some of these chemicals, when used according to the manufacturer's directions, will destroy a crop of crabgrass without seriously harming the desirable grasses. To assure a weed-free lawn, however, the home owner must supplement even the best chemical treatments with improved maintenance practices. No chemical will eliminate crabgrass from a lawn permanently.

Here are a few basic facts and practices that will help to reduce crabgrass infestations:

1. The best time to start a new lawn or to patch up an old one is early fall. Preparations for a new lawn in this area should begin about September 1, so that seeds can be sown about mid-September.

2. Contrary to the common opinion, crabgrass is rarely introduced with grass seed. The most inexpensive seed mixture seldom contains crabgrass seed as an impurity.

3. The best time to add a chemical fertilizer is in early fall when it can be used to nourish the desirable grasses. Crabgrass is nearly mature at this time and hence derives little benefit from such applications.

Chemical fertilizers applied in late spring (particularly slowly available kinds) benefit crabgrass more than the permanent grasses. If one insists on adding nutrients in the spring, it should be done very early — in February or March. Thus the permanent grasses will be able to absorb these in April and May when they grow best, before crabgrass begins to germinate.

The following amounts and ratios of chemical fertilizer should be spread dry over each one thousand square feet of lawn area and watered in:

Twenty pounds of 5-10-5, or eighteen pounds of 6-12-6, or ten pounds of 10-6-4.

Also available are more concentrated and completely soluble chemical fertilizers which can be dissolved in water and sprinkled over the lawn. These give the lawn a quick boost when applied as soon as grass begins to grow in early spring.

4. In this area and particularly in sandy soils, lime is often very helpful. For new lawns or where old lawns have not been limed for several years, it is good practice to mix in about thirty-five pounds of ground agricultural limestone for every one thousand square feet. Where ground limestone is unavailable, hydrated lime may be substituted but at the rate of twenty-five pounds for each one thousand square feet.

5. Mow the grass frequently so that clippings are short enough to be left on the lawn. The mower should be adjusted to cut the grass one and one-half to two inches high. This is especially important in late spring and early summer. Cutting the grass "high" at that time will help to curb crabgrass, because this weed cannot tolerate shade and many newly germinating seedlings will fail to push through the relatively tall, desirable grasses.

Cutting the grass short — "shaving" — is highly undesirable for other reasons. It reduces the leaf area of the desirable grasses, thus decreasing their ability to grow. It also enables the sun rays to heat up the soil, to "scald" the grass, and dry out the soil.

6. Water properly during dry spells. The soil should be thoroughly soaked at widely spaced intervals or left entirely without artificial watering. Frequent, light sprinklings during a drought is one of the best ways to ruin a good lawn. Such a practice encourages the development of shallow roots, which die if water is suddenly withheld or are smothered by constant wetting of the surface. In addition, improper watering favors the development of crabgrass.

And Now Proceed With Chemicals

If the home owner is guided by the six points listed above, the battle against crabgrass is more than half won. The "coup de grace" can then be administered with chemical treatments.

The two most effective chemicals thus far developed for crabgrass control are potassium cyanate (KOCN) and a water soluble phenyl organic mercury complex (PMAS).

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A Dooryard

By Elizabeth[illegible]en

Common rue in the center, with *Salvia Greggii* to the right, and dianthus Old Spice and *Salvia Sclarea* in the foreground.

THERE is an old house on a country road, overshadowed by sugar maples and locusts, surrounded by ancient, gnarled apple trees, approached by a sanded path through a garden of old-time flowers and herbs. As one enters such a house, one feels the quality of timelessness, of patience and security, a cessation of motion; not, however, as though the clock on the mantel had stopped its ticking, but as though its measured quiet sound were inevitable — as though one stood motionless and silent in the very heart of a soundless and day-long snowfall. The house has enclosed the joys of years and weathered the storms as well, storms not only of nature but of family quarrels and vicissitudes.

The dooryard garden of another century has, and had, that same atmosphere. Traditionally enclosed and restricted as were their forerunners, the monastery gardens of the Middle Ages, the gardens of the castles and the manors; protected as were those by high walls or enclosures from marauders, from them came all that was known of health and of healing, of rare potions, of delight in color and fragrance. The dooryard garden to which we turn today, not only as escape from the involved and busy present, as epitome of security and restfulness, but as source of much that is valuable to us in our daily living, encompassed herbs which we know and use in our gardens and in our homes. They are on our kitchen sheives, in our medicine cupboards, on our dressing tables and our sideboards, and their fragrance and beauty delight our souls. For, to risk over-quotation from that master herbalist, John Gerard . . . *nothing can be confected, either delicate for the taste, dainty for smell, pleasant for sight, wholsome for body, conservative for health, but it borroweth the rellish of an herb, the savor of a flour, the colour of a leafe, the juice of a plant, or the decoction of a root.*

The wormwoods play an important role in any dooryard garden, so varied they are in habit of growth and in essence. Roman wormwood (*Artemisia pontica*) has little bitterness of the common wormwood (*A. absinthium*) which gives its name to the liqueur, and was used in colonial America as a tonic for young girls in the spring of the year. The foliage of the former, although very finely cut and delicate in comparison with the heavier and taller latter plant, is of the same pale greenish grey. The tall and shrubby southernwood (*A. abrotanum*), known as "Appleringie" in Scotland, is beloved as a doorstep accent and used for drying handkerchiefs, as it imparts its pleasant sharp scent to linens laid upon it for bleaching. It was, with sprigs of fennel, a white moss rose, a spray of balm, carried to church in the "meetin' bouquets" of an earlier day— plucked as one went sedately down the garden path of a Sabbath morning, no doubt, and possibly nibbled away during the long sermon. Its sharp pungence, chopped to a paste with loaf sugar, was made into balls the size of a nutmeg, taken thrice daily for sleeplessness . . . a rather contradictory use to its inclusion in the bouquets abovementioned. Tarragon is seldom mentioned in old garden lists, but today it is the most sought-for herb, for use in salads and in vinegar. Possibly because its culture is quite simple, gardeners do not seem to succeed with this *Artemisia Dracunculus*. It may be increased by root division in the early spring, when new shoots are just above the ground, and needs a very well-drained and sandy soil until established, when an addition of compost will increase its spread, important to the gardener whose family likes the fresh green tips in salads. *Artemisia Schmidtiana* grows in a delightfully silvery mound of silky filaments, a beautiful feature for a low border or corner accent.

The lovely pure blue of the borage stars (*Borago officinalis*) can be as surprising floated in a punch bowl to which the leaves add that refreshing cucumberish flavor, as at the top of a garden wall. For there they show to advantage to one on a lower level, as they are apt to turn their stars down. Woolly bunny's ears (*Stachys lanata*) makes a more decorative border plant than the famous "Sell-thy-coat-and-

r Herb Garden

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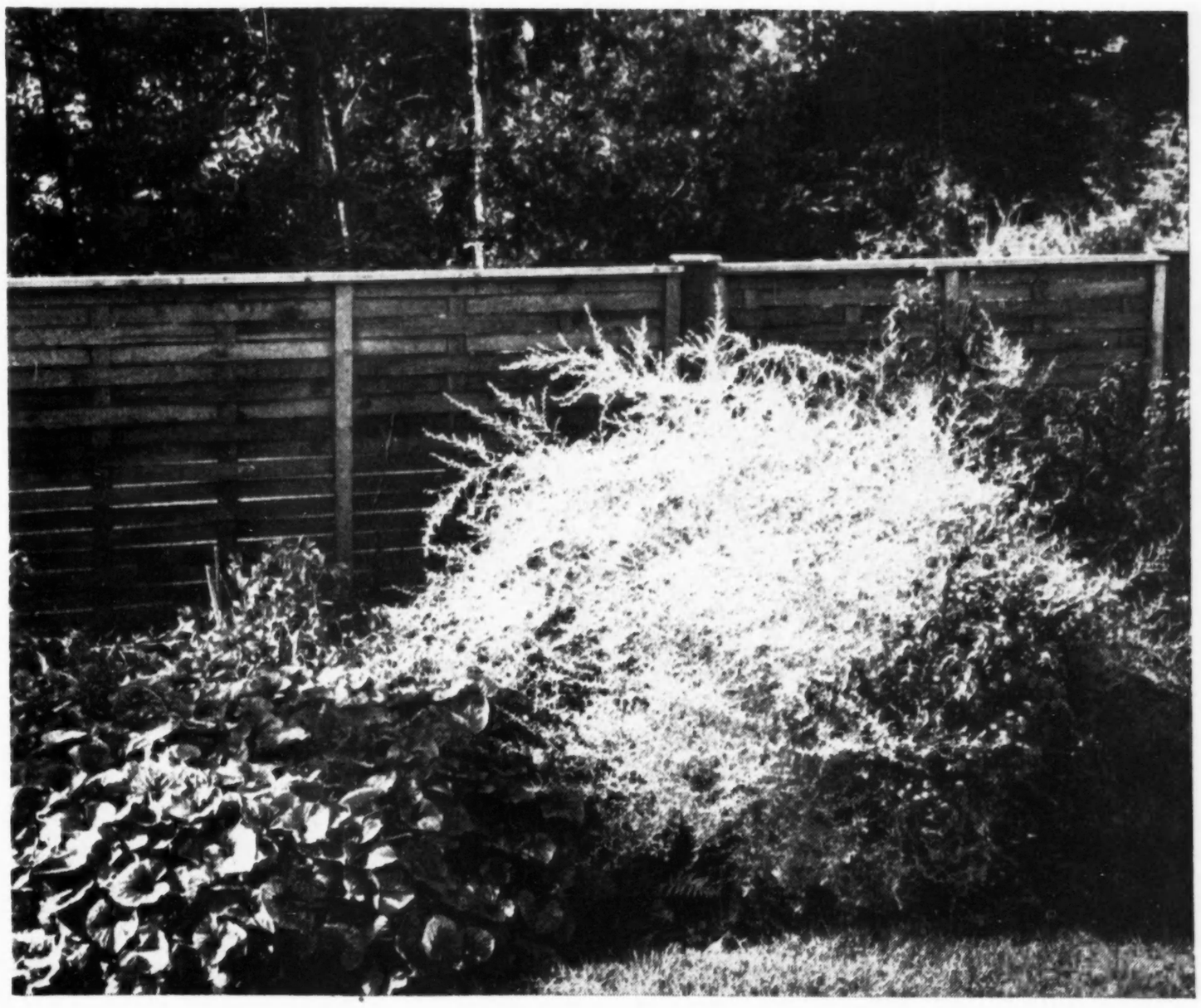


Artemisia Silver King with a luxurious clump of sweet violet to the left. When the violet blooms, the air in the garden is fragrant.

buy-betony" (*Stachys betonica*), used centuries ago for wounds, although that has a neat and tapestry-needlework appearance, which is as it should be, for I am positive I recognized it gracing a greensward in the Unicorn tapestries!

Another plant of strangely ageless pattern is the violet, which can be used decoratively as well as usefully in the herb garden. A thick and beautiful green, the clumps of heart-shaped leaves, and when the single *Viola odorata* blooms profusely in April and again to our astonishment in November, the air in the garden is fragrant indeed. The leaves make a valuable medicinal infusion.

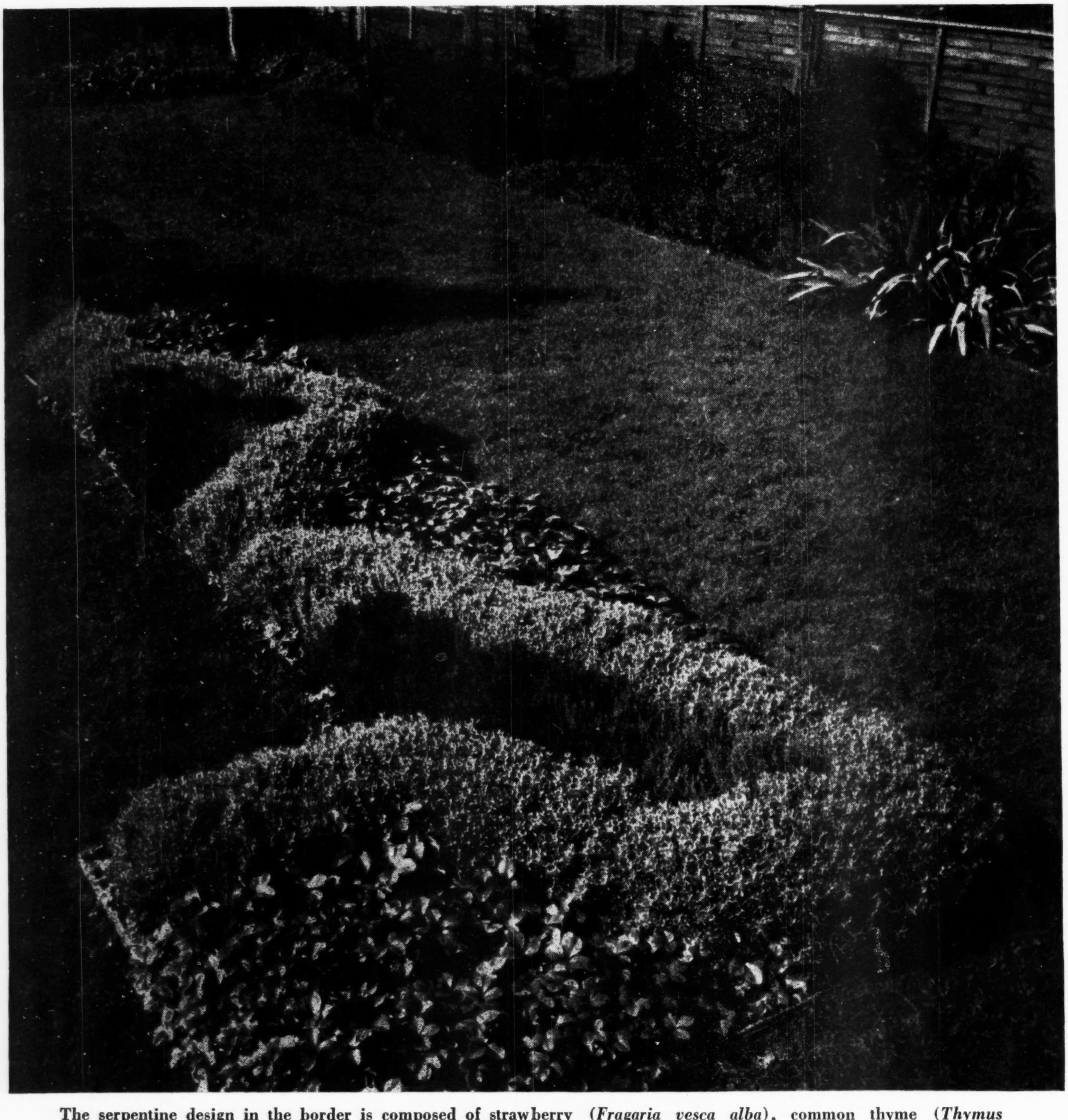
For decorative beauty, a low lavender hedge is a joy, for from it we may harvest at intervals as it seems to bloom in succession. Cut only those stalks with one bud open, for the buds should be harvested before blooming to retain the essential oil content which is dissipated with bloom. A plant or two of lemon verbena for drying, to mix with the lavender in bags, is worth its weight in gold, as it is a great favorite and deliciously refreshing on a warm summer's day. So also are the sweet geraniums, important in the rose bowl; also for adding their rosy pungence to apple jelly. The true pot marigold (*Calendula officinalis*) adds a golden gleam to the herb garden, all the more startling because of the quiet tones of other herbs, greys, grey-greens, blue-greens, with bloom of white and mauve and pink, lavender and palest lemon-yellow.

Rue (*Ruta graveolens*) is a lacy, fern-like, filler plant, its eighteen-inch blue-green height bearing odd pale yellow bloom in June. It is a shrubby perennial needing to be cut back in very early spring to within a few inches of the ground. Its leaves are too acridly musty for present-day palates but bits of young tender growth in thin bread and butter are intriguing with hot tea. Sage (*Salvia officinalis*), also being woody, needs cutting back if it is not to become leggy. It is one of the most decorative of herbs whether in or out of bloom, the grey camel-tongue texture of the foliage contrasting effectively with the shining dark green of wall germander or winter savory, or the plumy, grass-green fennel.

Clove pinks (*Dianthus caryophyllus*) are spicy and carelessly gay at the top of a retaining wall, spilling into the border below — they seem at home in any dooryard, past or present, and perfume the air with their vari-colored fringed bloom. Thymes are indispensable as edgings or to hang over steps or stone walls. *T. lanuginosus,* the woolly thyme, is the most interesting, the white and delicate *Serpyllum albus,* a close mat of pale green; the lemon thyme, a cushiony fragrance for an edging; and *T. vulgaris* and *T. v. fragrantissimus,* the best for seasoning.

Seasoning? Our grandmothers knew the value of thyme for seasoning, surely—they may have inherited the tradition that courage comes with thyme! At any rate, with eggs and poultry stuffing, with celery soup and cheese dishes, a pinch of thyme is fragrantly invigorating. The kitchen shelf held sage for poultry, too, especially for sausage seasoning and for goose. A delicious spread is made from goose grease. Shave several small onions very thin, fry lightly to a golden-brown in the grease from a roast goose. Add a pinch of dried and crumbled sage to each cupful of grease and pour into earthenware pots. Serve at your next cocktail party (good, too, with tomato juice) with very thin rye bread or Melba toast to spread it on. It is marvelous! A couple of sage leaves laid upon the loin of pork while roasting adds flavor to the basting. On a fried egg, sage or rosemary—just a pinch, remember — will give the week-end guest a breakfast to be remembered.

Rosemary is a magic herb, not only to touch, to smell as one passes it in the garden, but to give its fragrance to veal, to chicken. Breasts of chicken, baked in cream, a topping of buttered breadcrumbs and a touch of rosemary, are a gourmet's dream. Rosemary laid upon one's pillow will bring happy dreams, so grandmother may have had her dream without the chicken. We who live near New York must bring our rosemary into the house for the



The serpentine design in the border is composed of strawberry (*Fragaria vesca alba*), common thyme (*Thymus vulgaris*) and lavender-cotton (*Santolina Chamaecyparissus*).

winters are too cold for this native of the shores of Spain and the Mediterranean. It will slip easily, even in the fall, although late summer cuttings root more quickly.

Sweet marjoram (*Origanum Majorana*) is another savory meat seasoning which has a timeless quality — a sort of inevitability, as though—with what else *could* it be used except soups and stews, or with chicken, turkey, beef, tomato juice and mushrooms? It is an annual here, not too easily raised from seed as it abhors damp and poor drainage, and even in a pot will curl up and die if over-watered for a few days. Another really ancient herb is winter savory — used before pepper was brought from the Indies; it is *bohnenkraut,* the bean herb, cooked with string beans to add its peppery flavor. Its twin, summer savory (*Satureja hortensis*) has a sweeter, more pleasing fragrance and can be used with veal and poultry even more pleasantly than the former, which has a rather wiry leaf texture.

All these herbs, it is to be assumed, are to be harvested for drying, when in bud — unless the seed is to be the harvest as in the case of anise, cara-

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For the Younger Generation of Gardeners

CHLOROPHYLL — AND MAN

By H. W. Rickett

If all the land were apple pie
And all the sea were ink
And all the trees were bread and cheese,
What should we have to drink?

A SMALL boy I knew used to pore over these words and the accompanying pictures, with wonder. The world depicted was blue-black and white, and full of despair. What indeed was there to drink?

But the question is even more serious than the child thought. For how would the supply of apple pie and bread and cheese be renewed? What should we have to *eat?*

Where *does* the food all come from? For more apple pie you must have apple trees. For more bread and pastry you must grow wheat. For more cheese you must grow crops — grain, grass, hay. We, living animals that we are, can remain alive only by virtue of living plants. As we grow and multiply, so must crops and gardens grow and multiply. Our world must be — not a blue-black and white world, or even a red or a yellow or a sky-blue world — but a green world, a world of green plants.

Some plants, to be sure, are not green. Mushrooms and molds and Indian pipe have other colors, so do trees in autumn and the red and brown seaweeds and plants grown for ornamental foliage (of these, however, more later). But the plants we live on, those we eat and those which our cattle eat, these are green plants. Ours is a green world, and if it were not, we should not be living in it.

What is this green color? Strangely enough it is much the same, chemically speaking, throughout all the vast diversity of plant life — all the grasses and trees and garden vegetables, roses and lilies and sunflowers, all the mosses and ferns and algae of the woods and waters; all contain one or more green substances which are sufficiently alike so that we call them by one name, chlorophyll.* This stuff is not spread on the surfaces of plants, like paint. In the great majority of plants it is found in bodies called chloroplasts, which form a part of the living protoplasm of plant cells. Chloroplasts are of various forms. If a small leaf of a common moss is examined through a microscope, it is seen to be composed of cells which are packed with minute round green bodies; these are the chloroplasts. Most of the chlorophyll in which we are interested is contained in the larger and more complex leaves of our cultivated plants. These are composed of several kinds of cells. Within a colorless skin, their interior is made of green cells, some side by side like the stakes of a fence, others fitting rather loosely together and bathed by air; the gases of this internal air pass in and out of the leaf through minute pores in the skin. Small round chloroplasts line the inner surfaces of the walls of these internal cells. Here and there among the green cells one sees the veins, mostly bundles of tubes; through some of the tubes water is brought to the leaf-cells, through others manufactured food is removed from the leaf-cells.

This living factory brings together the conditions and materials necessary for the making of our food. The materials are *water,* supplied from the roots, and the gas, *carbon dioxide,* present in air. The energy of sunlight causes the carbon, hydrogen and oxygen of carbon dioxide and water to be rearranged in a new compound, the simple sugar glucose. *But this will only occur in the presence of chlorophyll.* The green stuff in some way as yet not completely understood, traps the sunlight and enables the living mechanism to use its energy. There is a surplus of oxygen in the recombination of atoms, and much of this is released into the air—for us to breathe.

That first product, glucose, is usually transformed into starch. At night it is changed back to glucose, and moved to other parts of the plant, parts which have no chlorophyll. There it plays many parts; it helps compose the hard parts of the plant (such as wood), it contributes to the growth of living protoplasm, it accumulates as a surplus in roots and stems and seeds and fruits, usually changed into some other food. Besides all this constructive activity, glucose may, like any food, serve as the source of the energy by which the whole living mechanism runs. From that glucose comes, directly or indirectly, all our food; all the sugars and starches of roots and tubers and bulbs and seeds and fruits, all the fats and oils not only of seeds and fruits but of meat and fish also, all the protein whether plant or animal; and in addition all the vitamins and waxes and spices and drugs and fibers and woods and a hundred other things on which our lives and our complex civilization are dependent.

All our living depends on plants; and there is no substitute for them.* Any living cell can make food; given an organic material of the right kind, with perhaps certain inorganic substances in addition, any cell can transform it into a food. (We take sugar into our own cells and they lay it down as fat.) But only in green cells can food be made from the simple (inorganic) ingredients — the raw materials of life — and nothing else. Only plants can subsist on water and the gases of the air and the inorganic salts of the soil; and plants can do this only if they are green and exposed to sunlight. Those plants which are not green

* Derived from two Greek words meaning "green" and "leaf"; leaf-green.

* It is chemically possible to make food in a test-tube from carbon, hydrogen, and oxygen in simple form; but it is not economically feasible.

must live as we do at the expense of green plants. The red and brown seaweeds, however, are green — in the sense that they have chlorophyll; the other pigments mask the green color but do not prevent it from manufacturing food. The same is true of coleus with red and yellow leaves, and other "foliage plants." Only by virtue of their chlorophyll do they remain alive. And only by virtue of the surplus which green plants make do *we* remain alive. Were it not for chlorophyll, all our bread and cheese and apple pie would soon disappear in the natural processes of living — and never be replaced.

The amount of food a plant can make is limited. There is only so much sunlight in its growing season, only so much carbon dioxide in its atmosphere. Moreover, the number of plants one can grow on a bit of earth is limited; limited by the space they need and by the resources of the earth itself, the water and nutrient salts. It is easy to see, then, that there is a maximum amount of food which any land can produce. Beyond that figure no art nor science can prevail to make more. And beyond that figure man cannot go in feeding his millions. Some day, as population increases, there will be a time when no additional food can be found, when it will be impossible for the earth to support any longer the growth of humanity.

A Dooryard Herb Garden

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way, dill, fennel or coriander. The tips of the stems may be cut and dried thoroughly, either hung in a dry and airy attic or on papered cookie sheets in a cool (200°) oven until crisply dry, then stored in air-tight containers until used. At that time, crumble or powder only as much as is to be used at the time; for the crumbling releases the flavor and scent, which is the reason so many powdered herbs have lost flavor and savor by the time they are used. If in glass, store in a dark place, as exposure to light will fade and destroy their pungence.

For the medicine cupboard, herbs are invaluable, and surprisingly, coincide with many of today's drugs, though under simpler and more familiar names. Atropine, in today's news column as an antidote for "nerve gases", is merely a product of that earlier dooryard garden. Infusions, to be drunk hot upon going to bed, such as sage tea for a sore throat or beginning of a chest cold; camomile for that imminent cold in the head, with honey and a slice of lemon; a half teaspoon of aniseed in hot milk for sleeplessness or in a tea for colic — they all add up to relaxation and a measure of peace, and a sense of oneness with the universe. So much the better, too, if one sweetens the cup with honey from one's own hive of bees.

Long ago, a grandmother administered a special remedy for coughs, a tiny glassful of rich and fragrant brew from an old brown jug. It was darkly crimson and its aroma that of the fields and hedgerows. It turned the uncomfortable edge of the cough and left a pleasant memory. Included in the Pure Food and Drug label on cough medicines today, we may find the same ingredients. But the charm, the atmosphere of security and restfulness has gone since those lamp-lit days and the chemist's bottle is an impersonal, business-like substitution for the picturesque jug.

Magnolias

Continued from page 46

the greenish-yellow flowers are not very obvious against the foliage, and it is more effective when the three-inch red fruits ripen. Closely related to it, the yellow cucumber-tree (*M. cordata*) is much smaller and not common in gardens. Its flowers, however, are definitely yellow, and though small, four inches, are conspicuous.

The umbrella magnolia (*M. tripetala*) is another open-headed American tree with particularly handsome leaves, some of them twenty inches or more in length, crowded at the ends of the branches. The white flowers are proportionately large, up to ten inches in diameter, with six to nine petals. The fruits of this species are amongst the most ornamental, about four inches long and deep pink.

Somewhat similar in habit of growth and foliage, the whiteleaf Japanese magnolia (*M. obovata* or *M. hypoleuca*) is bluish-white on the underside of the leaves, which are from nine to fifteen inches long. The flowers are white, of six to nine incurved, thick petals, and about seven inches across. But they are made the more remarkable by the mass of red filaments in the center. Its red fruits are larger than those of the preceding.

The large-leaved cucumber-tree (*M. macrophylla*), another American species, has the largest leaves of any tree that can be grown in this region, occasionally thirty inches long and twelve inches wide. Like the Fraser magnolia, it is furnished with lobes at the base of the leaf but they are broader and rounder than in that species. The cream-colored flowers are of six petals, ten to twelve inches wide. The three-inch, egg-shaped fruits are deep pink.

The other extreme in size of both flowers and leaves is found in the sweetbay magnolia (*M. virginiana*), a native tree of the eastern coastal region from Massachusetts southward. In the southern part of its range it is evergreen; in this area it is deciduous. The sweetbay magnolia grows rather slowly and is one of the last to bloom. Its small, white, cup-shaped flowers do not appear until late May, but it produces a sparse succession for some weeks. The leaves are about five inches long, whitish on the underside, and the little, twisted red fruits are interesting when produced in quantity.

One of the most beautiful is the Oyama magnolia (*M. Sieboldii*), from Japan and Korea. It commences to bloom in June and, like the sweetbay, there is a succession for some weeks. The regular, cup-shaped, white flowers are fragrant, about five inches across, with a contrasting mass of crimson filaments in the center. It may suffer injury to the shoots in severe winters unless growing in a sheltered position, and will tolerate and, indeed, may prefer light shade.

Where they have room to develop, many of the magnolias have a very wide branch spread. Consequently, they are not ideally suited to small gardens; but as lawn specimens they have few equals.

Dr. H. A. GLEASON

Retires from The New York Botanical Garden

By Dr. A. C. Smith

THE retirement of Dr. Henry Allan Gleason from an active position on the staff of The New York Botanical Garden, in December 1950, came as an unwelcome reminder of the passage of time to his many acquaintances in professional circles. To them, it seemed most unlikely that the vigorous and perpetually youthful Dr. Gleason could have reached the age when able administrators are finally rewarded—by being permitted to retire and to devote themselves to scientific studies. Dr. Gleason's wish to free himself of routine duties, so that he might concentrate on research, was frequently expressed to his intimates in recent years, but he was called upon to retain an active part in the administration of the Garden's scientific program.

The New York Botanical Garden has utilized Dr. Gleason's administrative abilities for thirty-one years, during which he has served in several capacities, for the most part either as Assistant Director or Head Curator. In 1919 Dr. Britton, the Garden's first director, prevailed upon Dr. Gleason to leave the University of Michigan for the rapidly developing center of botanical research in the Bronx. At that time The New York Botanical Garden was a stronghold of the traditional type of taxonomic research, with Britton, Small, Rydberg, and their associates producing manuals and revisions with a speed that alarmed some of their professional contemporaries. Britton's chief interests had long since turned to the south, and he was deeply involved in studies of the Caribbean flora. At the same time an active collaboration for the botanical investigation of northern South America was developing among the Garden, the Smithsonian Institution, and the Harvard botanical institutions. In this environment, it was inevitable that Dr. Gleason's early interest in North

Dr. H. A. Gleason

American ecological problems should be modified by a curiosity about tropical flora. He had already had a taste of the tropics when, as a younger man, he had taken a world tour and had seen at first hand the botanical riches of Java from the vantage-point of the celebrated Buitenzorg Garden. An opportunity for him to explore tropical vegetation in America arose in 1922, when he spent an extended period in British Guiana. The material collected during this trip and subsequently (by a native collector taught by Dr. Gleason) permitted the Garden to extend its exchange relations with other institutions, and as a result botanical material from South America swelled the herbarium. To study and arrange these newly acquired tropical collections became Dr. Gleason's primary duty, and most of the time he could spare from administrative detail was devoted to such work.

As was inevitable, one group of tropical plants took his fancy, and he could not have made a wiser selection for monographic study than the melastome family. This rich and varied group, with several thousand species throughout tropical regions, impresses the most casual observer by its diversity and beauty. The only existing monograph, by Cogniaux, was already out of date, and Dr. Gleason found the classification and description of new forms, pouring in from tropical America during a period of accelerated plant collecting in the 1920's and 1930's, an agreeable and fascinating task. For future taxonomists his name will always be associated with the melastomes, and his careful revisions and meticulous descriptions will serve as models for others.

In 1927 the American Museum of Natural History sponsored the first of several exploratory trips to the remarkable range of mountains that separates Venezuela from Brazil, and subsequently Dr. G. H. H. Tate and his associates visited several parts of that range. Fortunately, Dr. Tate's interests embraced botanical as well as zoological collecting, and his material was turned over to Dr. Gleason. In a resultant series of studies, including a paper on the amazing botanical discoveries of the Tyler-Duida Expedition, Dr. Gleason initiated work on the "Lost World" area, a field in which the Garden has since played the leading part and in which it continues under the able guidance of Dr. Bassett Maguire.

But Dr. Gleason's talents have not been directed entirely toward tropical floras. His keen interest in North American plants has been manifested throughout his career, in such publications as keys to facilitate the ready identification of the higher plants of Michigan and the New York area. Wherever his headquarters, Dr. Gleason has made himself intimately acquainted with the local flora through field work and study. It was largely upon his initiative that the Garden un-

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Seeds

And Their Germination

Part II

By Frank C. MacKeever

"Oh, look. The seeds I planted four days ago have sprouted." Popularly speaking, this is true. Botanically speaking, germination has taken place. What is germination?

Remember, in the previous article, we spoke of a seed as being an embryo containing a miniature, dormant plant. Well, after it has completed its period of rest, this miniature, dormant plant will resume growth when brought into contact with the proper conditions of water, air and warmth. In most cases, light plays no part. When the young plant grows to the point where it ruptures the seed coat and emerges from within, then, we may say, our seed has germinated. Actually, germination is not complete until the young plant is able to support itself by means of its own physiological powers.

In order to see how this is achieved, let us observe the stages that take place in the germination of the average seed when planted. However, let us first bear in mind that there are four factors upon which germination depends, namely: viability, water, free oxygen and temperature.

By viability, we mean the ability of the seed to live — or that it is alive. But, being alive is not enough. For to be really good, seeds must have good vitality. Thus, their vigorous germs will produce vigorous plants.

It might be mentioned that, in a very few instances, the maturity of certain seeds must be considered to insure germination. These are the seeds of such plants as form their seeds early in the spring; hence, these seeds must be planted as soon as ripe. In other words, they will germinate at no time other than during the summer of the year in which they are formed.

Water, in carefully regulated amounts, must be available for absorption by the seed, because plant food must be in solution to stimulate and promote the growth of the embryo. Also, as the seed coats imbibe water, they become softened, thus enabling the growing embryo to break through more easily. The amount of water required for germination, varies with each species; in some cases, even with the varieties of a species. As soon as germination begins, the supply of moisture must be constant, but in moderation.

Free oxygen from the air is essential to activate the protoplasm of the embryo. As there is not a sufficient supply of free oxygen in the water contained by the soil, the depth of planting seed plays an important part in the success of germination. This is true, especially when seeds are planted too deep in soils that are apt to become soggy by early spring rains.

Temperature requirements for germination also vary with each species. Here is an old rule I like to follow: place the seeds of each species in the same temperature as that required for growing the mature plants.

In the space allotted to this article, it is impossible to point out and to tell about the individual requirements of the seeds of even a few species, that is, their preference for different degrees, or quantities of one or more of the above-mentioned factors which govern germination. Such being the case, it presents food for thought for future articles on cultural methods.

May I suggest that before any attempt is made to germinate seeds of any species, with which you are not familiar, you become acquainted with their cultural requirements.

In reviewing the four factors upon which germination depends, we became interested in "the cart". Now, let us look at "the horse" — the stages of germination of the average seed. Presupposing that four or five days ago we placed a few seeds in a seed germinator, from now on we shall be able to distinguish seven stages in germination.

FIRST, THE SEED SWELLS. In fact, we notice that our seeds have swelled nearly twice their size. This is due to water entering the seeds, partly by absorption and partly by osmosis.

SECOND, STORED FOOD IS CONVERTED, DIGESTED AND DISTRIBUTED. This process is not visible to our eyes, but we know that it has taken place because the seeds have become soft. Also, by removing a seed coat, we find that the usual opaqueness of the seed has now become more or less translucent.

It is in this stage that the stored food, in such forms as insoluble starches, oils and proteins, is converted into soluble sugars, fatty acids and peptones by enzymes or natural ferments. Thus, this stored food has become digested food within the cotyledons and is now ready for distribution and stimulation of the cells of the embryo into growth.

THIRD, THE SEED COAT IS BROKEN. As the swelling of the embryo increases, sufficient pressure is developed as to burst the softened seed coat.

FOURTH, THE CAULICLE APPEARS AND ROOTS DEVELOP. The caulicle (the first part of the stem between the cotyledons and the true root) emerges from the embryo and starts to point downward. As a point of interest: the seed of pumpkin possesses a caulicle which develops a "heel"-like structure that presses against one side of the seed coat and forces it open.

From the radicle (the extreme tip of the caulicle) the true root develops. As the root penetrates into the soil, it sends out radiating rings of root hairs. These adhere firmly to the soil particles about which they pass in search of water. The absorption of water, by osmosis, takes place through the young parts of the roots and especially through the root hairs. This development of a root system is the first step of the young plant to support itself by securing access to water and mineral matters; as well as another meaning of the word support — that of anchorage for the stem.

Another point of interest: suitable pressure gauges attached to the cut stumps of certain plants indicate that the roots of each plant absorb water in such quantities as to create a root pressure (due to osmosis) sufficient to raise water over fifty feet. This osmotic pressure can be measured and, in certain forms of plant life, this pressure exceeds three hundred and fifty pounds to the square inch. Some of the most modern steam locomotives

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IN OUR NATION'S SERVICE

WHAT does The New York Botanical Garden care about a soldier's feet? We can understand the Army's interest because, in spite of what a general said about an army's traveling on its stomach, both the GI's and the top brass know it does as much traveling on its feet. Therefore, any information that throws light on that common ailment, athlete's foot, is important to the Army. Some people are not aware that this disease is caused by a fungus which bears the tongue-twisting name of *Trichophyton mentagrophytes,* and that The New York Botanical Garden has been investigating it for some time.

Many of the hundreds of thousands who annually visit the Garden look upon it only as a place of relaxation or a refuge from care. And, when thinking about it, they envision peaceful scenes of mothers and children basking in the warm sunshine on its green lawns, or reclining in the cool shade of the magnificent Tulip-trees. But there are many others, including government officials, military leaders, industrialists, and business men who realize the impact of the institution on the economy and health of the nation.

In times of national stress, as in World War II, The New York Botanical Garden clearly demonstrated the value of its botanical, horticultural, educational, and research facilities. It met the demands of government and private enterprise for trained men to seek new sources of such materials as rubber, sisal, quinine, curare, and other drugs in Central and South America. It cooperated with government agencies in working on insecticides and fungicides. It furnished the armed services with data on plants suitable for camouflage. It informed the Office of War Information on the terrain of a little traveled area which had been explored by one of the Garden's botanists. It aided the Quartermaster Corps by supplying information about plants that are poisonous when touched or when eaten.

The New York Botanical Garden is singularly equipped to help the government and industry in many ways. For example, the Bell Telephone Company faced a problem in connection with Army Air Forces contracts in the last war. A fungus which develops on the insulation of copper wires in the tropics was causing short circuit interference with the mechanism of airplanes. The Garden was able to identify the fungus and suggest the remedy.

The Navy, too, has turned to The New York Botanical Garden on occasion. At one time it was faced with the task of bringing timber out from the Amazon jungle. Our library was consulted for information on the specific gravity of a certain wood to determine whether it was heavier than water and railroads would have to be built to transport logs, or whether it was lighter and logs could be floated down the river.

Through exhaustive plant studies in the fifty-six years of its existence, The New York Botanical Garden has made far-reaching contributions in many fields. The results of its investigations have been felt in medicine, reforestation, and in the manufacture of such diversified products as cosmetics, plastics, insecticides, and cereals.

The findings of the nutritional investigations carried on in our laboratories are reflected eventually in the health of the population. By means of *Euglena gracilis,* the plant which puts an ugly greenish coat over some ponds, the anti-anemia vitamin B_{12} is now being investigated. Yes, this tiny plant requires an intake of B_{12}. True, the quantity is minute, since the plant is microscopic — 2,500 or more barely cover a pin head! But this plant is important in research to determine where the vitamin originates, what other things besides *Euglena* at one end and man at the other end need B_{12}, and how B_{12} functions in the production of those very necessary red corpuscles.

The Garden's program of research also includes the study of anti-bacterial substances, similar to penicillin, and, to date, ten new antibiotics have been discovered. While these are active in a test tube, they are either inactive, or too poisonous, to be used on animals, so their therapeutic values are dubious. However, there is always the ray of hope that from the tedious, painstaking efforts of scientists will come another agent to heal mankind.

Our scientists spend days, months even, examining the important herbarium specimens at the Garden, and studying plants which are important as foods, medicines, and insecticides. Over 2,280,000 dried specimens are included in this herbarium which serves humanity in many ways. For instance, a manufacturer, worried by the curtailment of the normal supply of a plant he employs in his product, turns to The New York Botanical Garden for help. What plant can be substituted? Will it serve the same purpose? Where does it come from? — A medicinal house knows that an important drug is derived from a rare plant. Does another species of the same genus which is more readily obtainable yield the same drug? — A chemist wants the name of the tree from which the natives of Ecuador get a fish poison, because this is being adapted as an insecticide on some North American crops. — Our herbarium helps to supply all these answers.

The New York Botanical Garden is able to respond promptly to the varied demands of these critical times because of the wise and thoughtful manner in which it is administered during years of peace. Life itself is completely dependent on plants. Without plants there would be "no food, no fuel, no existence," to quote Dr. William J. Robbins, the Director of The New York Botanical Garden. "We value plants for their beauty, for the aesthetic pleasure they give us, but we cannot escape the fundamental fact that our future largely depends upon our understanding of plants as an integral part of our economy." Written in the early days of World War II, these words could just as well have been expressed today, as once more our nation gears itself to face the critical period ahead.

Swapping with Nature

Continued from page 35

each plant generously with a good all-purpose insecticide.

Not all the plants used in swapping with nature need come from woods-gardens. Quite often they may be obtained from nearby areas doomed for building or other purposes. Frequently. transfers may be made from one wooded area where certain plants — e. g. pink ladyslippers or leather wood-ferns — are plentiful to more accessible locations in other woods at considerable distances.

But a word of caution here. Only skilled woods gardeners, well versed in the requirements of the species involved, should transfer woods plants from place to place in the woods. Before undertaking such a task, you should make a careful study of available literature, especially with regard to shade, moisture, and soil-reaction requirements of the species to be moved.

Perhaps in this brief discussion, we've made swapping with nature sound pretty complicated. It isn't, really; and, properly carried out, it will greatly increase your own pleasure, serve well the cause of sound conservation, and add much to the enjoyment of folks who chance upon the back-to-nature offspring of your tame woods plants.

Spring Chasing

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mountain, hermit thrushes and Blackburnian warblers in the woods, while juncos, "white-throats" and "black-polls" predominated higher up. A Canada jay scolded and laughed at those who would find spring. As we ascended, evergreens replaced deciduous trees and were in turn replaced by scrub growth at timberline. The trail became clogged with snow, buds were dormant on the balsams and bird voices were absent. A brisk climb on a cold bare rock ridge brought us to the summit and the superlative view which is a portion of the climbers' reward. As we stood enraptured, white flakes fell about us. Could this be a touch of winter? Close examination showed them to be spring blossoms of the aspens borne aloft by the breeze.

Here in this land of rarified atmosphere, we had not only caught up with spring — we had overshot her. In a few short days we had achieved our goal and had been privileged to experience the bursting of buds, the first flush of early blossoms and the songs of newly arrived birds twice in one year. We returned from this adventure with relaxed minds and renewed vigor for our daily tasks. Travel north with spring and know the sheer joy of living.

Seeds

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have boilers which produce but two hundred and fifty pounds pressure per square inch.

FIFTH, THE COTYLEDONS AND THE PLUMULE (the bud between the cotyledons) APPEAR, AND UPWARD GROWTH BEGINS. When the descending root has secured sufficient anchorage by means of root hairs, or by lateral roots, then the upward growth commences. Hence, the cotyledons are withdrawn from the seed coat and elevated above the surface of the soil—or other media.

However, in some cases, as, for instance, peas and acorns of oaks, the cotyledons are too thick to serve as foliage leaves. They remain beneath the surface and lend further aid to the roots in anchoring the seedling.

SIXTH, ALL PARTS EXPOSED TO THE LIGHT, MORE OR LESS, TURN GREEN. As the cotyledons spread open, the first true leaves unfold and turn green. This designates the presence of chlorophyll and the ability of the new plant to manufacture new food — its own. The young plant is no longer dependent upon the food formerly fed by its nurses, the cotyledons. In many cases, even they turn green (perhaps with envy) and function similarly to true leaves — as the cotyledons of the tomato.

SEVENTH, WITH ALL PRIMARY PARTS FULLY EXPANDED AND VITALLY FUNCTIONING, GERMINATION IS COMPLETE. When all the embryonic parts have become fully expanded to form a plantlet having its root system firmly anchored in some media, its stem erect, the cotyledons and first true leaves wide open and green, then germination is complete. The young plant is now capable of supporting itself by means of its own physiological powers (vital functions) and under proper cultural methods will continue to develop, as new parts are formed, into a seedling—the next cycle of its life history.

In writing this article and the preceding one, I have endeavored, by using words for pigments, to paint a mental picture of that ember which lies within a seed. Fanned into life, that ember becomes a seedling — an infant plant. When next you hold a seed in your hand, I hope that you will have a better perception of that particle of life in suspension within that mysterious little bundle — a seed.

Dr. Gleason Retires

Continued from page 53

dertook one of its major projects of recent years — a complete new edition of the comprehensive *Illustrated Flora of the Northern United States* of Britton and Brown, first published in 1896-98 but long in need of revision. For the past twelve years the rewriting of this three-volume work has been Dr. Gleason's principal project. It is now in press, and its appearance is eagerly awaited, not only by amateur botanists and naturalists, but by professional taxonomists as well. It is quite likely that this major production is the one which future generations of students will most closely associate with Dr. Gleason's name.

Dr. Gleason received his early botanical training in midwestern schools, receiving the degrees of B. S. (1901) and M. A. (1904) from the University of Illinois. After carrying on graduate work at the Missouri Botanical Garden and Ohio State University, he studied at Columbia and was given the Ph.D. degree in 1906. Returning to the midwest, he served with distinction on the faculties of the University of Illinois (1906-10) and the University of Michigan (1910-19). It was during his tenure at Michigan that Dr. Gleason came into prominence in

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Controlling Crabgrass

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Although its name sounds foreboding, potassium cyanate is relatively non-poisonous to humans and animals, and it is non-caustic. Farmers have been using it to control weeds in onion fields for many years under the name "aero-cyanate."

It has been used extensively for the control of crabgrass in lawns for only the past two years. For such purposes, it is sold under a wide variety of trademarked names. A few names are: Crabgraxx, Crab-not Crabgrass Killer, Double O Crabgrass Killer, Miller PC Weed Killer, Weedanol Cyanol and Weedone Crabgrass Killer.

Although potassium cyanate can be used during all stages of crabgrass growth, it is most effective if applied when the weed is growing vigorously and well before seed formation. The usual practice is to dissolve three ounces of the chemical in three gallons of water and this is sprayed over one thousand square feet of lawn area. The treatment is repeated once or twice at weekly intervals.

For very large lawns on estates and for golf courses a considerable saving in cost is possible by purchasing "aero-cyanate" and using it at the rate of eight pounds in one hundred gallons of water for an acre of grass. The three applications of this material will cost about twenty-five dollars an acre.

The PMAS treatment for crabgrass control was discovered and developed at the Rhode Island Experiment Station. The material has been available for this purpose for about five years.

Experience with the material has varied. Some home owners have obtained excellent control of crabgrass. Others have not only failed to control crabgrass but have seriously damaged the more desirable grasses in the lawn. I have heard of one lawn-maintenance firm which treated two hundred lawns with complete success. The reasons for these widely varying results are not clearly understood.

This chemical is caustic and must be handled with great care. Moreover, since it contains a soluble form of mercury, it is also deadly poisonous.

PMAS can be applied from mid-June to early September when the crabgrass plants are plainly visible. It, too, must be used well before the plants reach maturity because the seeds are difficult to kill once they are formed.

Two and one-half ounces of a ten per cent PMAS solution are diluted in five gallons of water and sprinkled or sprayed over one thousand square feet of lawn. Three applications at ten-day intervals are required for good control. A period of several weeks must elapse before the crabgrass dies.

A dry form of phenyl mercury acetate was widely publicized last summer. The active ingredient was mixed with a granular material which permitted easy and uniform application directly from the package. As with the liquid applications, the results obtained by home owners ranged from good control to no control whatsoever.

Controlling Other Weeds

Completely effective and nearly fool-proof are the so-called selective weed killers containing 2,4-D (2,4 dichlorophenoxyacetic acid). These give almost perfect control of broad-leaved weeds such as dandelion and plantain with but a single application.

This type of weed killer is non-poisonous, non-explosive and relatively non-toxic to the grasses in the average lawn. They are more injurious to turf containing a large proportion of bent grasses, and are extremely toxic to any legumes such as clover.

An application in April or May, using the dilution recommended by the manufacturer, will largely eliminate dandelions, plantain and certain other broad-leaved weeds from the lawn.

The main precaution to heed when using 2,4-D weed killers is to prevent drifting of the material to nearby trees and shrubs. They are harmful to many kinds of trees, shrubs and vines. Another precaution is never to use a spray tank that has been used to apply 2,4-D for spraying fungicides and insecticides on trees and shrubs. Once a container has held 2,4-D, it is virtually impossible to remove all traces of the chemical. Hence, where considerable spraying of 2,4-D is done, a special sprayer should be set aside.

Poison Ivy Control

No discussion on weed control would be complete without a few words about poison ivy. To really appreciate why this plant is so difficult to control, one should realize that well-established plants have long, underground stems or rootstocks. To effect good control, therefore, one must not only kill the above-ground parts but these below-ground parts as well.

Small areas infested with poison ivy can be cleared (preferably in early spring or late fall when heavy protective clothing can be worn comfortably) by grubbing.

Where this cannot be done, spraying the plants some time between June 15 and September 15 with a solution of ammonium sulfamate (Ammate), at the rate of three quarters to one pound of the dry chemical in a gallon of water, will give good control. A gallon of the solution should be sufficient to cover an area of about one hundred square feet. Where plants still show some green within a week or so after the first treatment, it is well to repeat the application.

Poison ivy vines growing on old trees can be sprayed with the material, provided the tree's leaves are not sprayed and not too much of the material is allowed to soak into the ground.

Where poison ivy is growing among other plants, such as in yew and privet hedges, ammonium sulfamate cannot be used. Here one should cut off the ivy plants near the ground at frequent intervals until they no longer sprout from the roots or underground stems. Bear in mind that ammonium sulfamate will kill other vegetation and that the soil will be completely unproductive for months where too much of the chemical is allowed to soak into the soil.

Poison ivy can also be controlled by spraying with 2,4-D compounds. It is again wise to warn the user that such material cannot be used in the vicinity of valuable trees and shrubs. Directions for diluting and applying 2,4-D materials are found on the containers.

Combinations of 2,4-D and a more recently developed plant hormone, 2,4,5-T, are available. These are excellent for killing brush in general, including poison ivy. They are not selective, however, and will damage trees and shrubs if applied carelessly..

TREE TRAILS AND HOBBIES. Ruth Cooley Cater. 324 pages, illustrated with photographs, indexed. Doubleday & Co., Garden City, N. Y. 1950. $3.50.

Out of her close observation and experience of many kinds of trees in this country during the past seventeen years, Mrs. Cater has written a book, somewhat unusual in design, which will help many with only a slight knowledge of tree identities, forms, parts, homes, habits of growth, and other details, to learn much more about them in an easy fashion. For this is a book which can be picked up and read at odd moments, in short sections, without thereby losing any thread or aught of its charm or value. It is well designed to stimulate inquiry and interest, more especially in the younger generation, although most readers of any age will learn new facts somewhere in its pages.

As the author lives in California, the emphasis is clearly on trees of the Pacific Coast and Rocky Mountain regions, and we find little, for example, concerning the eastern or southern maples, oaks, ashes, walnuts, butternuts, or hickories, while the American elm, hornbeam, and hop-hornbeam are entirely wanting. However, there are some compensations for these omissions in other quarters — the Florida yew and stinking cedar are included, while the conifers receive rather more generous treatment than the broad-leaved species.

The book is divided into "main trail", a general review of the ground covered, and "side trails" of diverging branches-- flowers, fruits, seeds, leaves, buds, names, habits of growth, literary allusions, immigrant trees, and so on. Fifty-six photographs of varying size and quality illustrate the text throughout.

Finally there is a glossary of botanical terms, a bibliography of twenty-four items from J. C. Loudon to L. L. Kumlein and Rutherford Platt, from which McMinn and Maino's *Manual of Pacific Coast Trees* (1946), and Coker and Totten's *Trees of the South-Eastern States* (1945) are somewhat surprisingly omitted. Few factual and no typographical errors have been noted; on page 95 the number of service-berries in the United States should read eighteen, not three, (G. N. Jones, 1946). The proper name of the monkey-puzzle is *Araucaria araucana* K. Koch, not *A. imbricata* Pav.

B. O. Mulligan
University of Washington Arboretum

CHRYSANTHEMUMS FOR PLEASURE. Ernest L. & Aleita H. Scott. 320 pages, illustrated, indexed. Published by the authors, 64 South St., Bogota, N. J. 2nd ed. 1950. $5.

The home gardener who wants to grow all types of chrysanthemums, even the large-flowered varieties, outdoors or in a greenhouse, now can throw caution to the wind, for with this new book as his guide, nearly any amateur can succeed with this flower. Every step in culture, from making cuttings and divisions to staging flowers at a show is given thorough treatment. Whereas this volume is called a second edition, to all intents and purposes it's a new book, completely rewritten and expanded to over 300 pages compared with the original 100-page size.

The history of the chrysanthemum, found in the first chapter, is a prelude to the following chapters on bloom structure, classification of varieties and species, and bloom form which, when mastered, will give the fancier a solid understanding of the entire group.

The second part of this four-part book is devoted to the fundamentals of culture beginning, logically, with soil preparation. Chapters of special significance and value in this section include the ones on insect pest control and disease control and the chapter titled "Signs of Trouble" in which all the ills that show up in blooms, buds, foliage, stems and roots are described in an extensive table, along with a diagnosis of the causes.

The decorative use of chrysanthemums, either in the garden or in arrangements, is referred to as "synanthy", a word coined by the authors. The approach is largely from an artistic and theoretical standpoint, rather than in terms of simple planting and arrangement compositions for everyday use.

It is quite natural that Dr. and Mrs. Scott, who have long been widely known for their extensive collection of varieties grown for garden display and exhibition purposes in their New Jersey garden and greenhouse, should devote close to one-half their book to the technical aspects of pinching and disbudding to produce show-quality sprays and blooms, growing pot plants including cascades, and the construction of outdoor shelters for late flowering varieties grown in the garden. There's a 17-page chapter on breeding. This entire section is especially well illustrated. The material supplied here is of special value to the fancier, since much of it has been inaccessible to the average amateur heretofore.

In the last part, the social aspects of devoting oneself to this flower as a hobby are touched upon in separate chapters on exhibiting blooms at shows, principles of judging them and the activities of official chrysanthemum societies.

Probably the only important omission that the amateur will sense in reading this book is the almost complete lack of discussion and selection of varieties suitable for garden use.

Paul F. Frese, Editor
Popular Gardening

HOW TO BUILD GARDEN STRUCTURES. Henry B. Aul. 384 pages, illustrated, indexed. Sheridan House, New York... 1950. $3.50.

An excellent book with detailed directions for the construction of those additions to the garden, which make the garden an intimate usable part of the home.

Grills, terraces, shelters, arbors, fences, gates, etc., are illustrated and shown with working plans, with step by step directions for building. This makes it easy for the merest amateur to construct any garden feature without the fear of running into trouble, which so often makes him shy away from undertakings of this kind.

Costs of contract prices can easily be cut in half with the guidance of this book and anyone interested in making the garden more pleasant, more usable for the entire family, young and old alike, cannot afford to be without it.

The landscape artist or contractor will find the book a 'must" for excellence in design, for help in cost determination and, last but not least, for the comprehensive coverage of a field which constantly calls for new and unusual structures, not ordinarily found in ready reference.

This book should go a long way in helping to make our gardens an integral part of the home.

A. C. Pfander.

BOTANY — An Evolutionary Approach. R. Darnley Gibbs. 554 pages, illustrated, indexed. Blakiston, Philadelphia, Pa. 1950. $6.

Dr. Gibbs says in his preface that it is good to start a course in botany with a familiar plant, but that to the modern student a flowering plant is *not* familiar. He reverts, therefore, to the order of presentation more familiar many years ago, starting with the "simple" and working up to the "complex" so as to "follow Nature's order— an evolutionary sequence."

If these contentions be granted, then many recent texts have been barking up the wrong phylum of plants. However, this reviewer still feels that a bean (for instance) is at least *more* familiar to a beginning student than a blue-green alga. As Gibbs himself admits, some concessions are necessary; in his opening pages one runs across such old friends as *Allium* and *Elodea*. Indeed to base oneself on an evolutionary sequence necessitates some strange makeshifts. Discussion of photosynthesis and transpiration must be delayed until Chapter 20, and anaerobic respiration and fermentation are in Chapter 12 (on fungi), while there is no real discussion of respiration in general. For an introduction to the nuclear cycle we must read the chapter on seaweeds; but

mitosis is described in the ubiquitous onion root-tip, which here does duty as an alga. In short, it seems to me that the "evolutionary approach" is only possible at the cost of a lack of emphasis on the fundamental processes of plant life, which must be just glanced at in passing; this is essentially a textbook of plant morphology.

As such, it is for the most part very well done. There are errors, of course; no one can write on the whole field of botany without making mistakes. One bad blunder occurs on p. 108, where the columella of *Rhizopus nigricans* is said to be "cut off by a cross-wall" even before the enlargement of the sporangium. On p. 277 the term epigynous is wrongly explained and illustrated by a figure which might represent a rose hip. The discredited terms periblem and plerome still appear in the account of the dicot stem.

In his classification, Gibbs follows the modern trend of dividing the algae into a number of "phyla" (including that singular anomaly, the "Euglenophyta"), but —inconsistently as it seems to me—lumping most of the fungi into one group, the "Eumycetophyta." And when are we going to throw the "Gymnosperms" out with the "Thallophyta"? It is praiseworthy to work toward a more modern classification of the plant world, but it should deal with the *whole* plant world.

The book is well designed, well printed in the currently fashionable double column, and copiously illustrated with mostly original drawings and photographs of very good quality. It should be of service to a young botanist as a handy reference work; but I should hesitate to recommend it for teaching the average American class in elementary botany.

H. W. Rickett

DECIDUOUS FORESTS OF EASTERN NORTH AMERICA. E. Lucy Braun. 596 pages, illustrations, bibliography, index. Blakiston, Philadelphia, Pa. 1950. $10.

This authoritative book deals with the comparative phytosociology and evolution of the nine principal forest "regions" recognized within the Deciduous Forest Formation. The aim is "to present information on the *original* forest pattern of eastern North America and on the composition of virgin forests, to analyze and compare climax communities, to trace the expansions and contractions of the . . . Formation and its segregation into types, and to demonstrate the genetic relations of its several parts."

A concise review of the principles and terminology of forest ecology is given. The three hundred pages of descriptions and comparisons in Part II will probably be of most interest to the majority of readers. Each one will find detailed information — and often photographs — on the outstanding remnants of primeval forest in his locality. The general organization into regions is along rather familiar lines. The "Lake Forest" area, considered by some as a distinct formation, is here a division of the Hemlock-White Pine-Northern Hardwoods Region. A Western Mesophytic Region, west of the Mixed Mesophytic, is recognized.

Much data on general plant geography is presented. A twenty-seven page species index bears witness that shrubs and herbs are not neglected. Chapters in Part III correlate forest development with the paleobotanic record and physiographic history.

Two unusual features are the color reproduction on the front cover and the availability of separate linen copies of the large insert map of forest regions and their sections in relation to topographic features.

Alton A. Lindsey
Purdue University

MAIZE IN THE GREAT HERBALS. John J. Finan. Foreword by Edgar Anderson. 191 pages, illustrations, bibliography. Chronica Botanica Co., Waltham, Mass.; Stechert-Hafner, Inc., New York. 1950. $3.

Mr. Finan's study provides one of those unusual instances where a master's thesis is instrumental not only in procuring a degree for the author, but also adds considerably to our knowledge. Following a foreword by Edgar Anderson, under whose general direction the work was done, the author sets forth in clear chronological sequence the history of the introduction of maize into Europe as depicted by the Renaissance herbalists. Beginning with Hieronymus Bock's *New Kreuterbuch* which appeared in 1539 and continuing with the works of Fuchs, Dodonaeus, Camerarius, Bauhin, Parkinson and others the reader is offered descriptions, illustrations, uses and, in some instances, theories of origin of the kinds of maize known to the herbalists.

Certainly one of the most significant facts brought out in Finan's book is that two distinct types of maize were known to the herbalists. One of these, first illustrated in 1542, is similar to the 8-10 rowed flint and flour corns which dominated eastern North America in pre-Columbian times. The herbalists believed this corn to have reached Europe by way of Asia. The second type, similar morphologically to modern Caribbean varieties, was described in the latter half of the sixteenth century and was thought to have been introduced from America. The author suggests that this type of maize was likely brought to Europe by early Hispanic explorers.

A brief appendix describes the historical background of woodcuts; how they are made and how they differ from other graphic processes. The work is copiously illustrated with twenty-five reproductions of woodcuts from the herbals, and the publisher has done a beautiful job of "dressing up" the little volume in an attractive binding. It should be of interest not only to students of maize but to botanists who have not experienced an adventure into the great herbals themselves.

William L. Brown
Pioneer Hi-Bred Corn Co.

HUMUS AND THE FARMER. Friend Sykes. 392 pages, illustrated, indexed. Rodale Press, Emmaus, Pa. 1949. $4.50.

This book is another presentation of evidence for the urgent needs of trials for the determination of the value of foodstuffs grown only with the use of organic versus the production of crops with chemical fertilizers. The author speaks convincingly, purely and simply from his experience as a farmer. Many technical terms are used without the restriction imposed on their meaning by the scientist. This, however, does not reduce the value of the contents, based on lifelong study and observation.

Continued on page 64

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News, Notes and Comments

Meyer Medal presented to Colonel Robert H. Montgomery. On December 15, 1950, a distinguished group of about 100 persons gathered at the U. S. Plant Introduction Garden, Miami, Florida, for the annual presentation of the Meyer medal. This medal is presented by the American Genetic Association in memory of Frank N. Meyer, one of the first and greatest of the Department of Agriculture's plant explorers.

David Fairchild, founder of the Section of Foreign Seed and Plant Introduction of the Department of Agriculture, told the story of Meyer's contributions to agriculture in this country, consisting largely of economic plants from China, the Caucasus and Turkestan, and related the tragic story of his death on the Yangtse River. Meyer's will included a legacy to the members of the Section who had been his co-workers and it was unanimously decided to use this legacy for a memorial medal, to be awarded to outstanding plant introducers.

Two distinguished men were awarded the medal at this meeting: Dr. Wilson Popenoe, Director of the School of Agriculture at Lancetilla, Honduras, founded as a public service to Central and South Americans by the United Fruit Co.; and Col. Robert H. Montgomery, Founder and Director of the Fairchild Tropical Garden, and Member of the Board of Managers of The New York Botanical Garden. Following is the citation which was given to Col. Montgomery.

"It takes four inches of fine print for *Who's Who* to list Colonel Montgomery's accomplishments as a public accountant. He was one of the great pioneers in this field, and his many volumes on this subject are the standard authorities. For a time, as a professor, he taught accountancy at Columbia.

"Those of us who have gardens are peculiarly indebted to him for obtaining the important decision that our rare valuable trees, when blown down by storms or injured by frost, represent losses quite as legitimate as those suffered when fire damages our buildings — and so we can claim losses in our Federal Income Tax returns.

"But it is not for these things, important to us though they are, that we are honoring him here today. It is rather because of his deep interest in gathering together rare species of trees into collections where they can be cared for and will furnish seeds for his friends and for the arboreta of this country.

"The New York Botanical Garden, of which he is a Trustee, owes to Colonel Montgomery a collection of rare conifers which he had introduced and grown in his arboretum in Cos Cob, Conn. At great expense he transferred them there by truck. These rare trees, many of them unknown in this country, will furnish seeds for use by foresters and gardeners wherever they will grow. Some of these were collected by Joseph Rock, explorer for the Office of Plant Introduction, in the mountains of Asia.

"Becoming fascinated by the beauty of palms, Colonel Montgomery, following his friend George P. Brett, came to this, the warmest winter spot in the United States, and, with the help of friends, got together all the species of palms he could find that were already growing in Florida and at the same time he sent abroad for a host of others from the Tropics. In a few years the Montgomery Palmetum had become well known to lovers of palms from all over the country.

"So absorbing did this quest for new palms and other trees become to the Colonel, that he stirred up his friends to join him in the formation of a garden that the public could enjoy, and also an association for the encouragement of tropical gardening in South Florida.

"Working quietly and at great personal cost, he and Mrs. Montgomery, with the aid of the distinguished landscape architect, William Lyman Phillips, have made the Fairchild Tropical Garden which is largely made up of introduced ornamental plants. The actual work of exploring is only one of the phases of plant introduction. The nursing of those little plants and their care until they fruit, is another. In this field, as anyone can see who will read the book giving the history of the First Ten Years of the Garden, Colonel Montgomery is easily today a foremost pioneer.

"To record your distinguished services historically, Colonel Montgomery, I am authorized by the Office of Plant Introduction, through the American Genetic Association, its custodian, to hand you the Frank N. Meyer Medal."

Harold F. Loomis, In Charge
U. S. Plant Introduction Garden

On World Cruise. Col. Robert H. Montgomery and Mrs. Montgomery sailed on the "Caronia" early in January on the first round-the-world cruise by an Atlantic liner in more than a decade. Dr. William J. Robbins received a letter from Mrs. Montgomery, written on board ship, from which the following is taken:

"We enjoyed going through the Canal. It took all day but every moment was exciting and interesting. As they are just out of the rainy season, the growth along the shores is lush and green. I am very proud that I could identify a yellow-flowering tree growing all over as our favorite *Cochlospermum;* it also grows wild in Acapulco. We treat it as a rare tree!

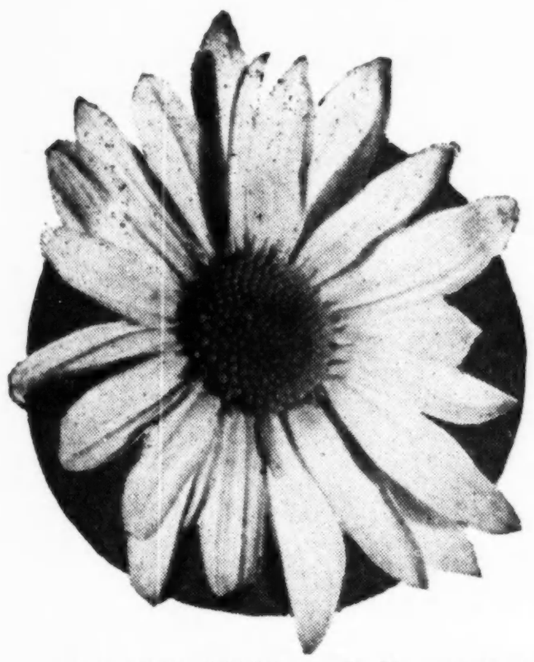
"Sandy (Dr. Fairchild's son) and Eva Fairchild met us and took us to their house in Ancon for a Panamanian dinner; then drove us to the Summit Garden the next day where we met Dr. Walter Lindsay, the Director. We were impressed with an avenue of "cannon ball" trees in full fruit. We have *one* tree which has bloomed at the Fairchild Tropical Garden but has never fruited.

"Another stunning clump was the sealing wax palm, *Cyrtostachys renda*, with brilliant red stems. We also saw a beautiful specimen of Dr. Fairchild's pet piggafeltia palm, tall and handsome with a bamboo-like green stem and pinnate leaves."

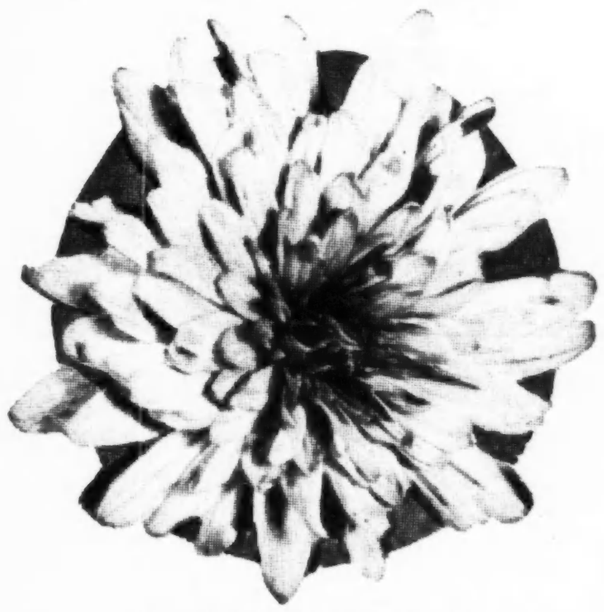
Gift of Strophanthus to The New York Botanical Garden. The first set of the L. J. Brass and E. F. Woodward collection of *Strophanthus* botanical specimens obtained on the Upjohn-Penick Expedition has been donated to The New York Botanical Garden. The material comprises 134 sheets, representing 21 entries, or about half of all those known from Africa. It includes 8 photographs of 10 *Strophanthus* species or the habitat where they grow. The botanical specimens, excellently prepared, often contain flowers, fruits, seeds, and other parts in such ample portions as to have required two sheets in the mounting. The data or field notes on the labels accompanying them are greatly detailed and as nearly as possible transmit the rich field experience of the collectors into the herbarium.

This valuable collection includes fruiting material of *S. Ledienii*, probably the first since the original collection in 1885, the type now having been destroyed at Berlin. It also includes the first known fruiting specimens of *S. gracilis*, a new variety of *S. Preussii*, and the rare *S.*

L. J. Brass examining a flowering specimen of *Strophanthus welwitschii* in Angola, Africa.

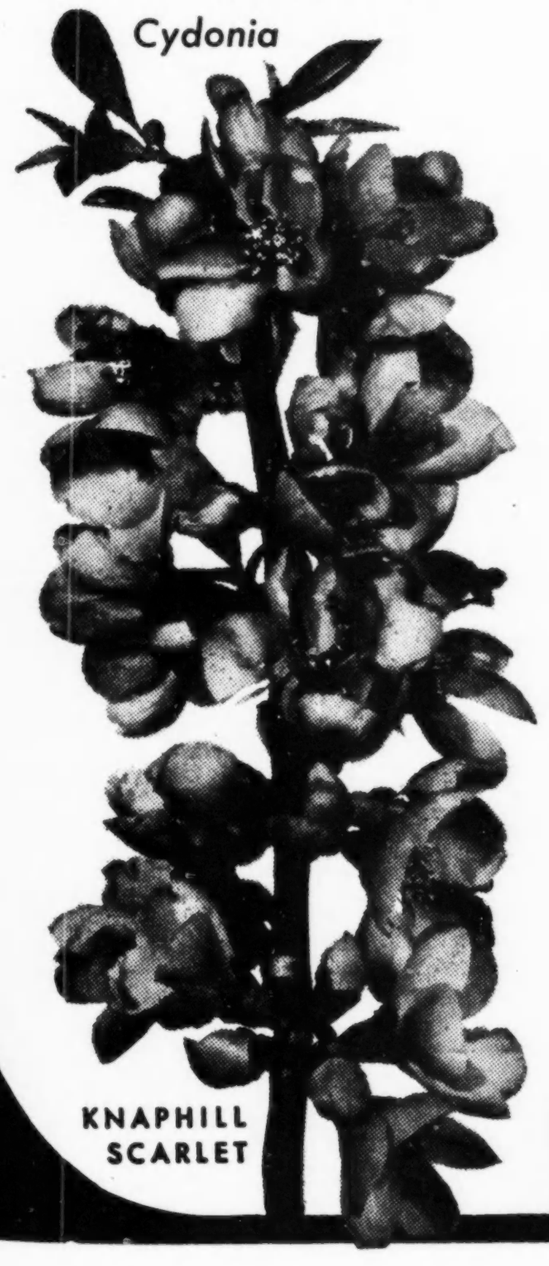


CROWN JEWEL, *Rubellum Hybrid*



AUTUMN ROSE *"Mum"*

Knaphill Scarlet. Rare new English origination. This exquisite lovely flowering quince is a choice, low growing plant. At tulip time, mound-like, 16" high plants are ablaze with large, showy flowers of vermilion red. Stunning as an accent for foundation planting, shrub border or around flower beds.
Ea. $3.50; 3 for $9.75



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PUT *Color* IN YOUR GARDEN

Whether your preference is for dramatic, bold colors—soft delicate pastels—or a happy combination of both, let Wayside Gardens' new Spring Catalog be your "palette". Paint your garden with nature's finest hues.

With the aid of this world renowned catalog, you can plan a garden that will be filled with a never-ending variety of delightful flowers, changing with the seasons through a lovely kaleidoscope of harmonious colors and interesting forms.

NEW CHRYSANTHEMUMS

Autumn Rose. One of the most enchanting new "mums" in our entire collection. Its unusual color is hard to describe. Subtle blending of coral, rose and Jasper red with soft buff undertones. Clusters of large, double flowers are fine for cutting. Starts blooming early in September. 2′ tall.
3 for $2.75; Doz. $8.50

New English Rubellum Hybrids, winner of Royal Horticultural Society "Award of Merit". 7 exquisite varieties in luscious shades of pink, lilac, bronze, old rose and deep wine-red. Low growing plants have hundreds of big, daisy-like flowers. These winter hardy new chrysanthemums come up year after year, increasing in beauty.
Collection: (1 ea. of 7 varieties) $6.00

NEW HEMEROCALLIS

8 brilliant hued new Hemerocallis that we recommend with great enthusiasm. Hardy 2′ to 4′ plants produce beautifully proportioned flowers in vibrantly glowing shades of softest yellow thru fiery red. Flamboyant new beauties will supply radiant, fragrant flowers from June until September. Illustrated is Dido, a lovely warm, clear apricot. Height 36 inches. *Collection:* (1 ea. of 8 varieties) $12.00

NEW PASTEL CANNAS

Six captivating new hybrids. Introduced last year, they have caused a sensation among our customers. Enormous trusses of gorgeous flowers in soft, delicate pastel shades of peach, old rose, yellow and gold. For luxurious color all summer, plant a few in front of foundation planting or in the border. *Mixture:* 6 for $4.00

SEND FOR THE WORLD'S FINEST HORTICULTURAL BOOK-CATALOG

*Almost 200 pages, with hundreds of gorgeous true-color illustrations and accurate descriptions of the world's newest and best shrubs, roses, bulbs, perennials and exclusive "**pedigreed**" root-strength plants. Not just a catalog, but a reference book with valuable garden data and complete cultural directions. To be sure you get your copy, it is necessary that you enclose with your request 50¢, coin or stamps, to cover postage and handling costs.*

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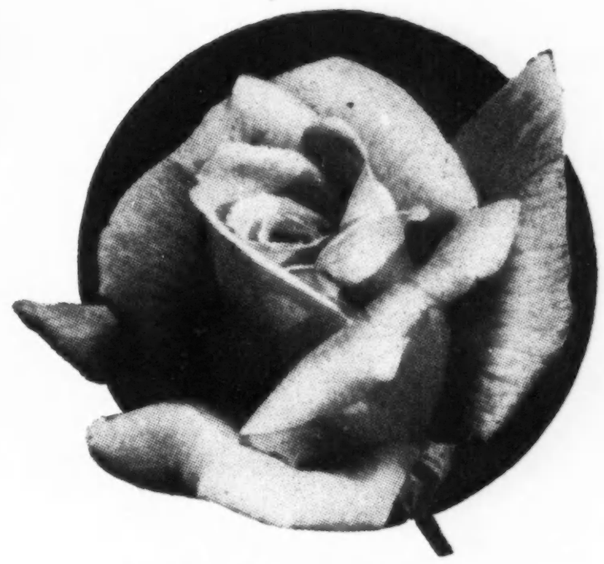
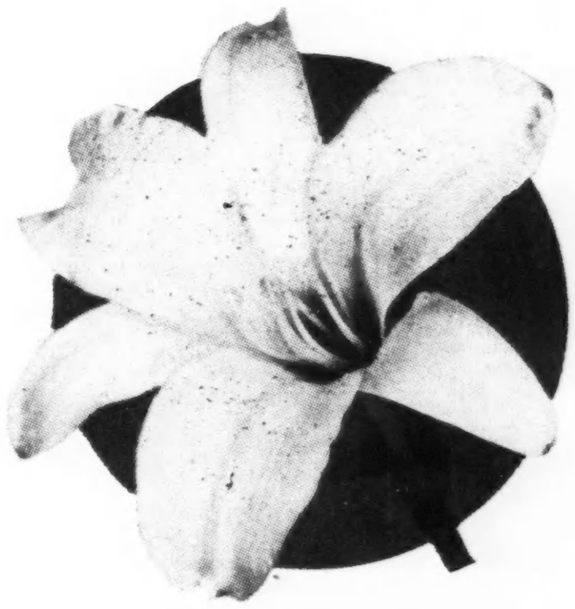
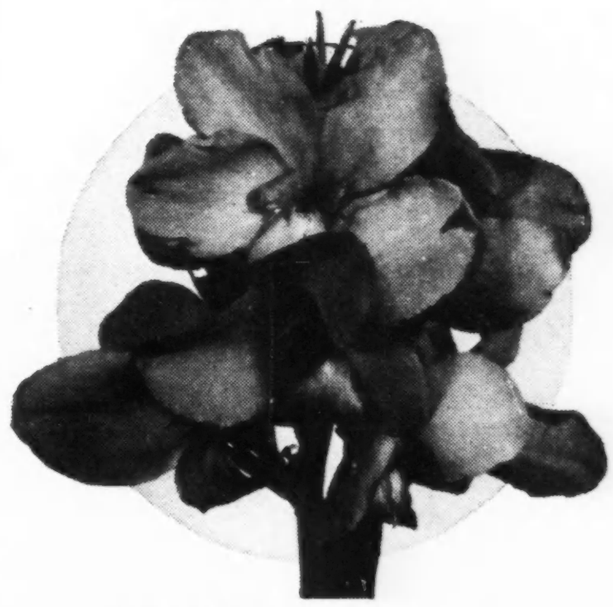


SUTTER'S GOLD, *Tea Rose*



DIDO, *Hemerocallis*



MIGNON, *Pastel Cannas*

erythroleucus. The last has helped reveal the true fruit and seed characters of a section of *Strophanthus* which has heretofore been misunderstood.

The expedition began field work at Douala, Cameroun, on November 30, 1949. It traveled through the French Cameroun, southward through Gabon to Angola, thence eastward through the Belgian Congo to Northern Rhodesia and northward through Tanganyika. Field work terminated at Dar-es-Salaam, Tanganyika, on May 28, 1950.

New York Botanical Garden-Kunhardt Expedition. The following has been taken from letters which Dr. William J. Robbins, Director, received from Dr. Bassett Maguire.

"The exploration of Huachamacari is over — we did a fairly good job and were exceedingly lucky. It appears that we got up at the only point at all physically possible. The flora is limited and, as was expected, found to be most clearly related to that of Duida, but also it has elements in common with that of Sipapo. Tell Dr. Gleason that there are no *Melastomes* obviously new to us, no new Guttiferae or Rapateaceae. The Compositae offered the most exciting new things, and, of all things, we got a red-flowered *Tyleria*.

"Our collection now exceeds 1,200 numbers, most of it pretty good stuff, and the most difficult part of our work should be over. We plan to spend a week on Yapacana which we should reach in three hours from the river and then proceed up the Ventuari.

"We made three trips to Yapacana — the climb was not difficult and the rewards considerable. However, the approach to the mountain was through some five miles of swamp and flooded savanna. Sometimes we were nearly waist-deep and our Indian carriers, who are not over five feet tall, did have a tough time. Camp was at a recently abandoned gold field at the base of the mountain.

"Collecting was excellent, new Compositae and Rapateaceae. Yapacana is a small mountain but rich. Its relationships are, of course, with Sipapo and Duida, but its flora distinctive. We have demonstrated, I believe, that a small isolated mountain can and does develop an endemic flora all its own.

"I have come down to San Fernando to bring all of our collected material, which will be stored here safely at the place of our good friends, the missionaries. Cowan and Wurdack have a touch of fever so left them at a pleasant place to rest for a couple of days, at the confluence of the Ventuari and Orinoco.

"Then we'll get off up the Ventuari — Cowan and Wurdack for Peru and I to join William Phelps Jr., at San Guam."

Spring Garden Tours. The following dates for The New York Botanical Garden's Spring Garden Tours, under the auspices of The Volunteer Associates, have been announced: May 8 — "Winterthur," the estate of Mr. and Mrs. Henry F. du Pont at Wilmington, Delaware, which is noted for its azaleas, and "Longwood," the estate of Pierre S. du Pont at Kennett Square, Pa. May 22 — Estates of Mr. and Mrs. Leonard J. Buck, Mr. and Mrs. Charles Scribner, and Mr. and Mrs. Reeve Schley in Far Hills, N. J. "Allwood," the Buck estate, has a very interesting rock garden, and "Ripplewood Farm," the Schley estate, includes a small wall garden and a secret garden. The house, once the Rocky Hill Tavern in Connecticut in 1776 and the Samuel Shipman Hotel in 1855, and moved piece by piece to Far Hills, will be open for inspection. June 5 — Tour to the estate of Mr. and Mrs. William Robinson Coe, "Planting Fields," Oyster Bay, L. I., where the rhododendrons will be at their peak of bloom; "Welwyn," the home of Mrs. Harold I. Pratt at Glen Cove, L. I., and "Wolver Hollow," the home of Mrs. C. Oliver Iselin, at Glen Head.

Prices of tours are as follows: $15.00, May 8; $7.50 each, May 22 and June 5. There will be a special ticket for May 8— write or call for further information to the Public Relations Office of The New York Botanical Garden, 801 Madison Ave., RHinelander 4-5767.

"Holland in Tulip Time." An authentic reproduction of a corner of the Netherlands at the height of the tulip season occupied the whole of House No. 4, Conservatory Range 1, during the days from February 22 through March 4. Five thousand of the finest varieties of tulips, hyacinths and daffodils bloomed in a typical Dutch landscape, complete with grass-bordered canal, a 30-foot high windmill, an open-air flower market, and an old Dutch cottage. The cottage was attractively decorated with porcelain ware, cheese-molds, tiles and prints, all of Dutch origin. Dutch girls in their colorful native costumes, acting as hostesses and tending the flower market, added to the atmosphere.

The bulbs were selected and given to The New York Botanical Garden by the Associated Bulb Growers of Holland and were transported to this country by the Holland-American Line as its contribution to this festival.

On February 25 special ceremonies took place at which Dr. Willem Cnoop-Koopmans, Consul-General of the Netherlands, was the guest of honor. Representatives of the Associated Bulb Growers of Holland, Holland-American Steamship Line, Royal Dutch Airlines, Netherlands Chamber of Commerce, the Dutch West Indies Bureau and the National Tulip Society were present on this occasion.

It was quite fitting that "Holland in Tulip Time" should be depicted in the borough of the Bronx, for the borough derives its name from the Bronx River. The river bears the name of Jonas Bronck who emigrated to this country from Holland in 1639. It flows through a wooded section of The New York Botanical Garden which has not changed since the days of Jonas Bronck.

International Flower Show. As this number of The Garden Journal of The New York Botanical Garden rolls off the press, the doors of Grand Central Palace, New York City, open on the 35th International Flower Show. In keeping with the theme of the Show, "Gardens for Town and Country", The New York Botanical Garden is exhibiting an American herb garden. The background is a reproduction of the facade of the charming Colonial home of the Misses Helen and Mary Whitman of North Salem, N. Y. In the kitchen, which occupies the low wing at one side of the clapboard house, are apothecary jars of herbs, pestle and mortar and other accessories, indicating that the modern housewife realizes the value of herbs as did the housewife of earlier generations. The herbs are planted in beds, separated by a grass path—the entire garden being enclosed within a picket fence. It is the type of herb garden suitable for a sunny location on the average suburban property — simple in design and practical from the viewpoint of upkeep and usefulness of the plants.

Mrs. Helen M. Fox, well-known authority on herbs, and Member of the Advisory Council of The New York Botanical Garden, has made up a list of herbs and their various uses. She has also prepared a statement about herbs and herb gardens and this, together with a foreword by T. H. Everett, Horticulturist of the Garden, accompanies each list. The literature may be obtained by visitors to the herb garden exhibit.

Beware of Hidden Tree Damage! In his recent talk before the Bedford, N. Y., Garden Club, Dr. P. P. Pirone, Plant Pathologist of The New York Botanical Garden, warned of hidden damage to trees as a result of the terrific wind and rain storm in November. "When the roots or bark are loosened," he said, "it invites insect damage and decay."

Dr. Pirone stressed the importance of feeding and pruning trees to make them strong and resistant to storm damage. Tree feeding in the East where the top soil has been depleted is necessary to avoid shallow root structure. The New York Botanical Garden is experimenting with the process of feeding trees through their leaves. He gave directions for setting blown-over trees in position again — the strategic points being to pack well to avoid air pockets and to water thoroughly. Watering is particularly important with evergreens which use up water all winter through their leaves. Deciduous trees should be pruned at the top, because it is inevitable that the fine roots will be destroyed — and these are the roots which control the top growth.

Dr. Pirone also talked at some length on tree losses as a tax deduction, calling attention to the table worked out by the late Dr. E. P. Felt which appears in the 1942 edition of his book *Our Shade Trees*. The same table is discussed in a handy book, *Tree Experts' Manual* by Richard R. Fenska.

Advisory Council, Officers for 1951. Chairman, Mrs. Hermann G. Place; First Vice-Chairman, Mrs. James C. Mackenzie; Second Vice Chairman, Mrs. Guthrie Shaw; Treasurer, Mrs. John E. Parsons; Corresponding Secretary, Mrs. Hugh Peters; Recording Secretary, Mrs. Barent Lefferts. Members of the Executive Committee in addition to officers of the Council: Mrs. Richard de Wolfe Brixey, Mrs. Charles Burlingham, Mrs. Henry S. Fenimore Cooper, Mrs. William Redmond Cross, Mrs. Elon Huntington Hooker, Mrs. O'Donnell Iselin, Mrs. Thomas M. Debevoise, Mrs. Percy L. Douglas, Mrs. William A. Lockwood, Mrs. Grafton H. Pyne, Mrs. Henry F. Schwarz, Mrs. Thomas D. Thacher, and Mrs. Antonie P. Voislawsky.

Art Exhibition. The Bronx Artists Guild will hold its 29th annual exhibition from April 1 to April 22 in the Museum Building of The New York Botanical Garden.

Advisory Council. The Advisory Council met at the home of Mrs. Augustus G. Paine, New York City, on January 31, 1951. After a short business session, Dr. William J. Robbins, Director, spoke on ways in which the Advisory Council can be helpful to the Garden. T. H. Everett, Horticulturist, discussed the rehabilitation of the perennial border.

Showing of Gardens and Penthouse Terraces. The annual showing of gardens and penthouse terraces, under the auspices of the City Gardens Club, will be held on May 8 and 15, 2:30—6 p.m. The charge will be $3.00 for each day's showing; $1.50 for a single garden admission. The money raised in this way helps to support the children's gardens in Manhattan under the direction of the City Gardens Club, and to buy materials for the Christmas ornaments which the club makes for Kingsbridge Veterans Hospital.

Stout Award for Hemerocallis. The Stout award for the top-ranking hemerocallis has been given to Hesperus. This award, made possible through the generosity of Dr. A. B. Stout, Curator Emeritus of The New York Botanical Garden, is given for the outstanding clone of a daylily and is in the nature of the well-known Dykes medal for iris. The Stout medal is to be awarded annually only on specific recommendation of not less than one-third of the accredited judges of The Hemerocallis Society.

Water Colors of Mushrooms. Forty water colors of mushrooms have been on exhibition in the Museum Building of The New York Botanical Garden from the middle of January through the middle of March. These were painted by Isabel Kelly Bird after she and her husband, Paul Bird, Editor of Art Digest Magazine, found many on their Connecticut property. Specimens of poisonous and edible varieties of mushrooms, native to New York and Connecticut, were also included in the exhibition. These were collected and mounted by Dr. Donald P. Rogers.

Flower Arrangement Course for Teachers

As a result of the keen interest the school children of the City of New York are taking in the flower arrangement competition held during the annual Chrysanthemum Show and Program at The New York Botanical Garden, teachers in the New York City School System have requested instruction in flower arrangement. A course has just been completed and another will soon get under way—the instructor, Miss Matilda Rogers of New York City. The classes for the teachers are held in the rooms of the School Garden Association, of which Marvin M. Brooks is Executive Vice-President.

Torrey Botanical Club. At the annual meeting of the Torrey Botanical Club on January 16, 1951, Dr. Harold H. Clum of the Department of Biology, Hunter College, was elected as the club's representative of the Board of Managers of The New York Botanical Garden. Dr. Clum succeeds Mr. Rutherford Platt who heretofore served in this capacity.

Correction. Mr. Arthur M. Anderson has called to our attention the fact that Mr. Gayer Dominick of New Canaan, Conn., was the former owner of Bulls Island, and not the Domenick Brothers, as stated in the article on page 32 of the January-February issue of The Garden Journal.

Membership in

THE NEW YORK BOTANICAL GARDEN

and what it means

TO THE INSTITUTION, membership means support of a program that reaches several hundreds of thousands of persons annually.

Briefly, this program comprises (1) horticultural display, (2) education, (3) scientific research, and (4) botanical exploration. To further this work and to disseminate useful information about plant life to the public, the Garden issues books and periodicals, both scientific and popular, and presents lectures, programs, radio broadcasts, and courses of study in gardening and botany. The laboratories and large herbarium and library serve the staff in its research and educational work, while the extensive plantings at the Garden give the public vistas of beauty to enjoy the year around. The public is also free to use the Botanical Garden's library, and, under direction, to consult the herbarium.

TO THE INDIVIDUAL, membership means, beyond the personal gratification of aiding such a program, these privileges:

Free enrollment in courses up to the amount of the annual membership fee paid.

A subscription to The Garden Journal (published bi-monthly) and to Addisonia (issued irregularly).

Admission to Members' Day programs and use of the Members' Room also at other times.

A share of plants when made available for distribution. (These plants may include the Garden's new introductions into horticulture.)

Personal conferences with staff members, upon request, on problems related to botany and horticulture.

Free announcements of special displays, lectures, broadcasts, programs, and other events.

A membership card which serves as identification at special functions at The New York Botanical Garden and also when visiting similar institutions in other cities; which allows 10 free rides upon The Garden's tractor-train, *The Floral Flyer*. Also, on presentation of membership card, parking fee on weekends is waived.

Garden clubs may become Affiliate Members of The New York Botanical Garden, and thus receive certain privileges for the club as a unit and others for individual members. Information on Garden Club Affiliation will be sent upon request.

Business firms may become Industrial Members of The New York Botanical Garden. Information on the classes of Industrial Membership and the privileges of membership will be sent upon request.

Classes of membership in The New York Botanical Garden are:

	Annual Fee		*Single Contribution*
Annual Member	$ 10	Member for Life	$ 250
Sustaining Member	25	Fellow for Life	1,000
Garden Club Affiliation	25	Patron	5,000
Fellowship Member	100	Benefactor	25,000

Contributions to the Garden are deductible from taxable incomes and in computing Federal and New York estate taxes.

A legally approved form of bequest is as follows:

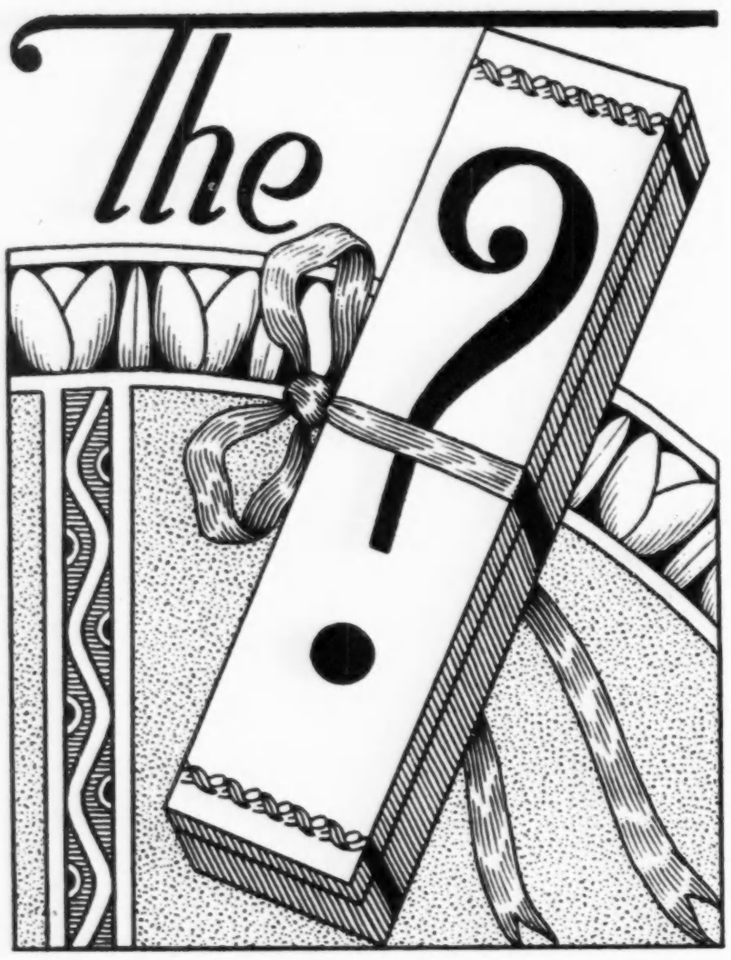
I hereby bequeath to The New York Botanical Garden, incorporated under the Laws of New York Chapter 285 *of* 1891, *the sum of*.....

Gifts may be made subject to a reservation of income from the gift property for the benefit of the donor or any designated beneficiary during his or her lifetime.

All requests for further information should be addressed to

THE NEW YORK BOTANICAL GARDEN

Bronx Park, New York 58, N. Y.



Address your questions to *The Question Box, The Garden Journal of The New York Botanical Garden*, Bronx Park, New York 58, N. Y.

Q. I've been told that I can control rust on hollyhocks and mildew on other garden plants by dusting with sulfur. Is this true, and if so can I use flowers of sulfur?

A. Sulfur dusts or sprays applied every week or ten days during the growing season will control the rust and mildew diseases. However, we suggest you use finely ground sulfur dust which is especially prepared for plant disease control. If you prefer to spray, use wettable sulfur powder, one heaping tablespoonful to a gallon of water. Do not use "flowers of sulfur" as a fungicide, because the size of the sulfur particles is too large to do an effective job.

P. P. Pirone, Plant Pathologist.

Q. I am never sure when to prune my shrubs. Is there any way of telling when this should be done?

A. As a general rule, spring-flowering shrubs like lilacs, mock orange, early flowering spireas and fragrant viburnum should be pruned right after they are through blooming. Late summer and fall flowering shrubs are usually pruned in very late fall, winter, or early spring.

P. P. Pirone, Plant Pathologist.

Q. What are some good books to use in identifying mushrooms?

A. Krieger, L.C.C., *The Mushroom Handbook;* Smith, A.H. *Mushrooms in Their Natural Habitats;* and Thomas, W. S. *Field Book of Common Mushrooms*, are in print and are very useful.

D. P. Rogers, Curator.

Q. We found some mushrooms growing in a manured field. If they were of an edible kind, would they be safe to eat?

A. The soil on which they grow doesn't have any effect on the wholesomeness of mushrooms. Mushroom spawn absorbs food as simple compounds in solution, not as decaying organic matter; the source of the compounds is of no consequence.

D. P. Rogers, Curator.

Q. Are cattail and milkweed floss of a similar nature in structure so that they may be used as substitutes for kapok?

A. Yes. These seed fibers have one major structure in common; the silky fiber has a hollow chamber which is impervious to air and water. This physical character makes the fiber buoyant and thus most useful as a filler for life preservers.

G. L. Wittrock
Assistant Curator of Education

Q. What is the origin of the word kapok?

A. Kapok is applied to a strictly American tree, yet the name is Javanese. The Portuguese in their famous travels throughout the world in the sixteenth century transported different plants from the New World to the Old World. That is how kapok got to Java. The natives made use of the seed fiber and gave the tree their native name, kapok. Our generic name for the tree is *Ceiba*, and ceiba is the Caribbean common name for this tree in the West Indies. It was given the name *Ceiba*, the Indian word for canoe, because canoes were made from its trunk.

G. L. Wittrock
Assistant Curator of Education

Dr. H. A. Gleason

Continued from page 53

the newly developing field of plant ecology; his invaluable contributions to the early development of this discipline in America are standard reading for students in that field. While at Michigan, Dr. Gleason served as Director of the Biological Station at Douglas Lake (1913-15) and as Director of the Botanical Garden (1915-19). His fondness for the informal, yet scholastic, atmosphere of the Douglas Lake station has persisted, and during several summers he left his post at New York to enjoy again the environment and acquaintances of northern Michigan.

Dr. Gleason has always taken an active part in professional botanical societies and he served in various capacities such organizations as the Torrey Botanical Club (vice-president, editor) the Botanical Society of America (treasurer, vice-president, president in 1948), and the American Society of Plant Taxonomists, founded primarily through his efforts (councilor, president in 1937). Membership in various honorary societies, including the Botanical Society of Czechoslovakia, is enjoyed by Dr. Gleason. During his several visits to European botanical institutions he made fast friends among scientists; it can be said without qualification that no American taxonomist enjoys to a higher degree the friendship, confidence, and admiration of European colleagues than Dr. Gleason. The regard in which he is held by his American colleagues is evidenced not only by their obvious affection for him, but by the honors they have given him. His addresses as retiring president of the American Society of Plant Taxonomists and the Botanical Society of America are remembered as models of wisdom and good taste.

The many students who have been so fortunate as to have Dr. Gleason as mentor owe him a great debt of gratitude. No teacher could be more generous with time and experience, more lucid in explaining the intricate procedures of systematic botany and nomenclature, or more encouraging than Dr. Gleason. His guidance of students was always mingled with a real personal concern, so that those of us who had him as teacher also had him as an intimate friend, frequently enjoying his and Mrs. Gleason's hospitality at their house on the hill in Bronxville. It is probable that his younger associates at the Garden count the hours spent with Dr. Gleason as the most valuable part of their botanical apprenticeship, whether in the performance of herbarium tasks or in the sociable atmosphere of the afternoon coffee table — an environment where his astonishing fund of knowledge and penetrating wit were equally in evidence.

All who know Dr. Gleason or his work hope that his retirement will be an opportunity to pursue the research of his choice in a tranquil atmosphere free of administrative duties. We join in wishing him many additional years of service to the profession he has so greatly enhanced.

BOOK REVIEWS

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The importance of rotation in modern farming is well presented. The author has also recognized and pictured the effect of subsoiling by the use of a special tool or — and this is important — by the use of selected crops known to be able to penetrate the soil to great depths.

The author did well in stressing the importance of mycorrhizal association and his observations are valuable. It is disappointing not to find any mention of the importance of the microbial waste-products (antibiotics) on the health of the plants, although the value of the microbial population of the soil is well indicated.

The author does not deal fairly with the value of chemical fertilizers, and the implication that soils become sterile from their use is incorrect. If this were true, we would experience fewer disease problems in highly fertilized soils. Also, should we follow the teachings of the organic gardener by not using any chemical fertilizers in the production of crops we (including the organic gardener) would soon go hungry.

As long as many of the plant foods taken from the farm soil are lost in the sanitation system of our modern cities, an economic substitution of these plant foods will be necessary.

The author disagrees with the modern scientist who has come to think in terms of feeding the plant directly by the use of water-soluble forms of chemical plant food. This may well be considered one of the highlights of the publication, since it will help to focus the spotlight on this erroneous concept. Feeding the soil to feed the plant is the underlying thought of *Humus and the Farmer*.

Even though the book is written and based on the experience gathered in England, most of the contents will have a familiar ring to anyone here who is truly interested in the welfare of our country.

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Technical Institute

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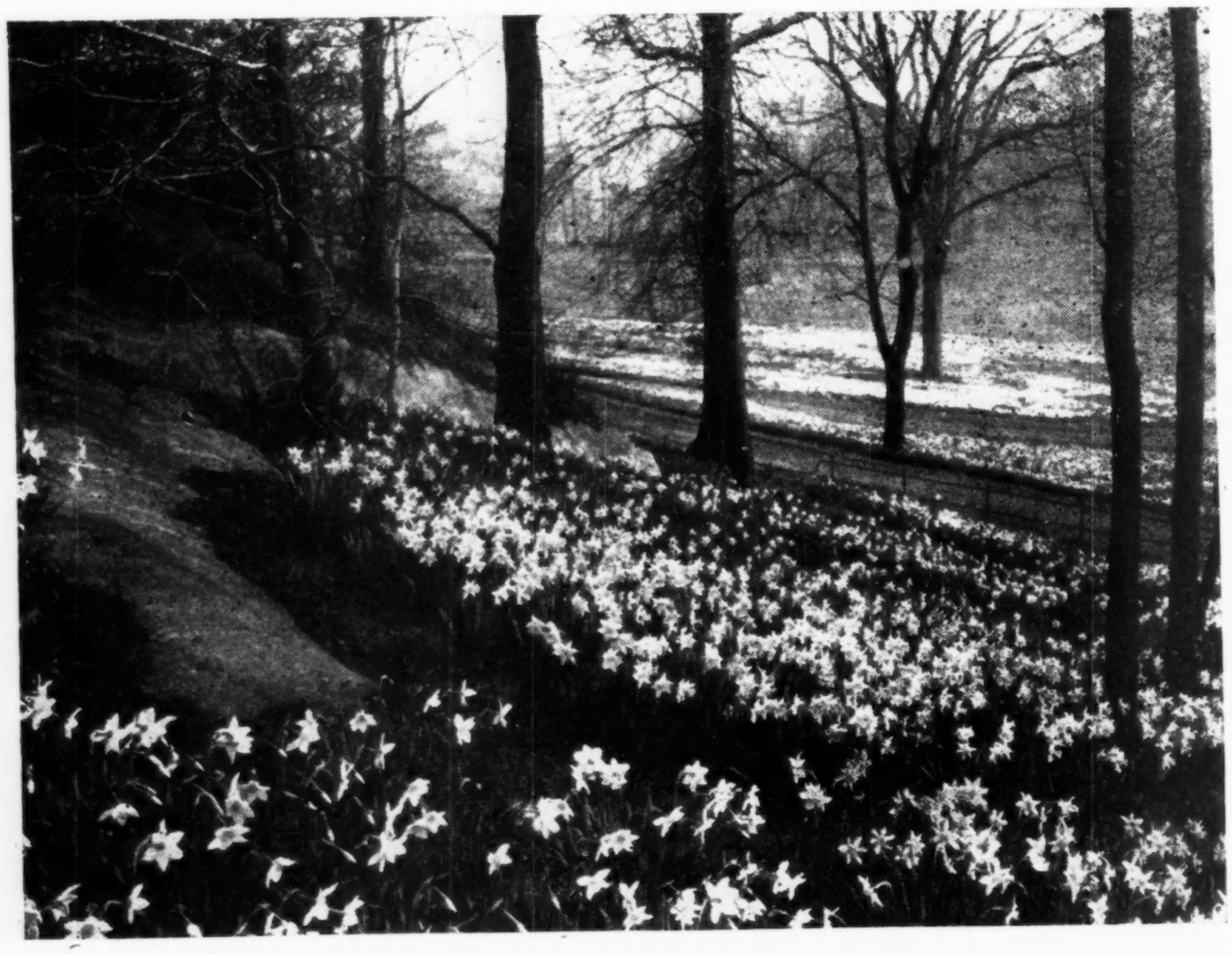
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